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# The Mining Journal

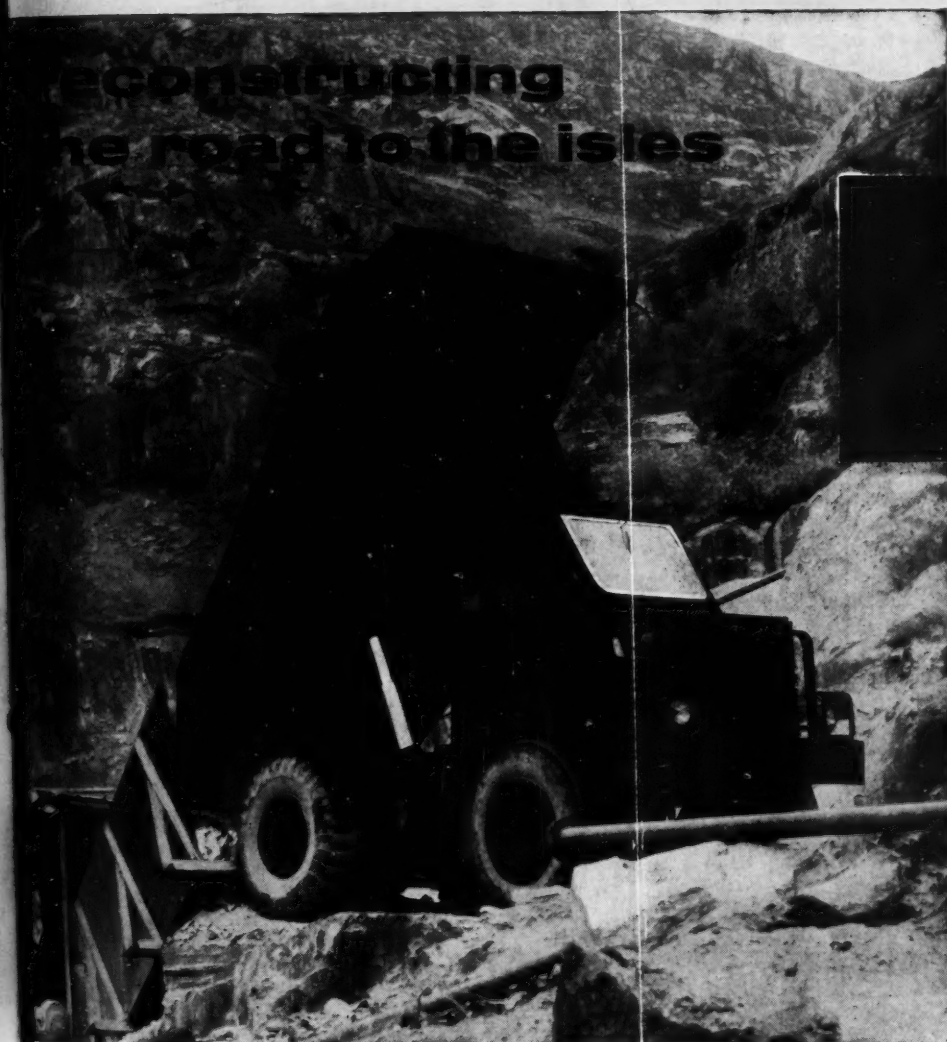
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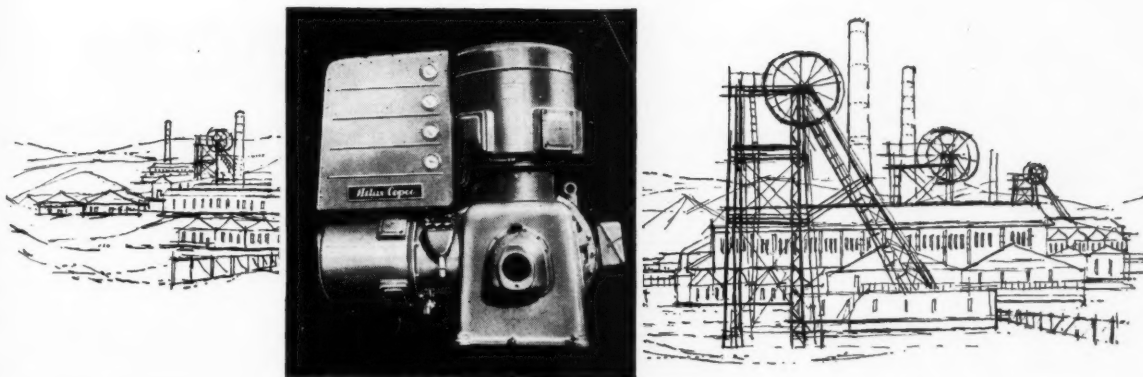
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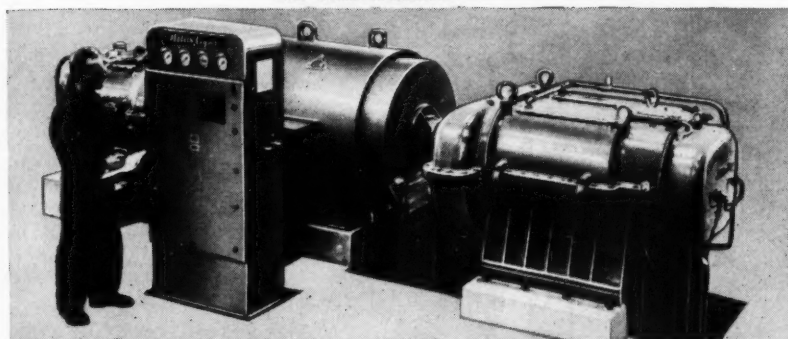
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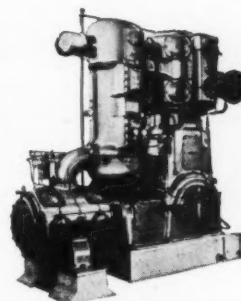




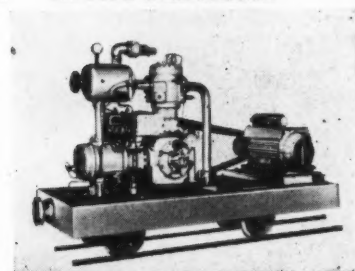
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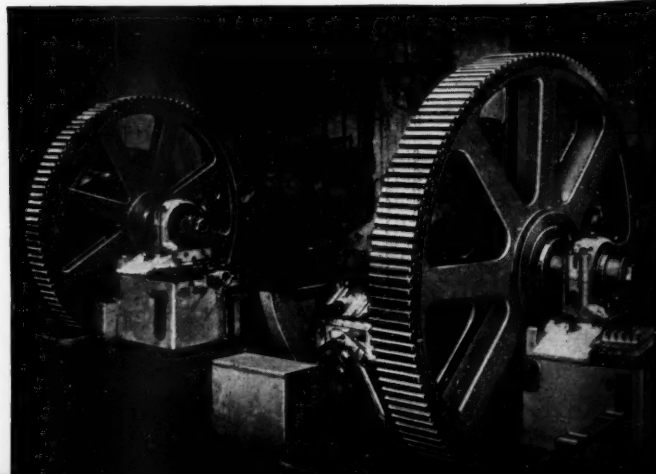
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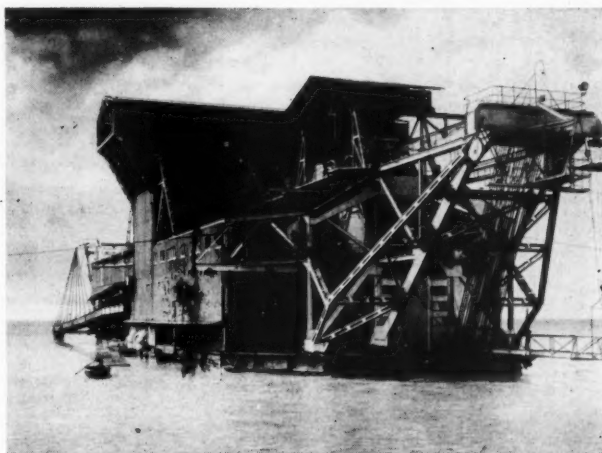
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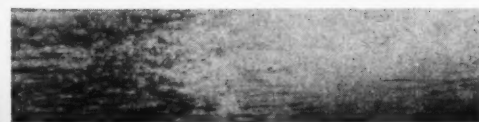
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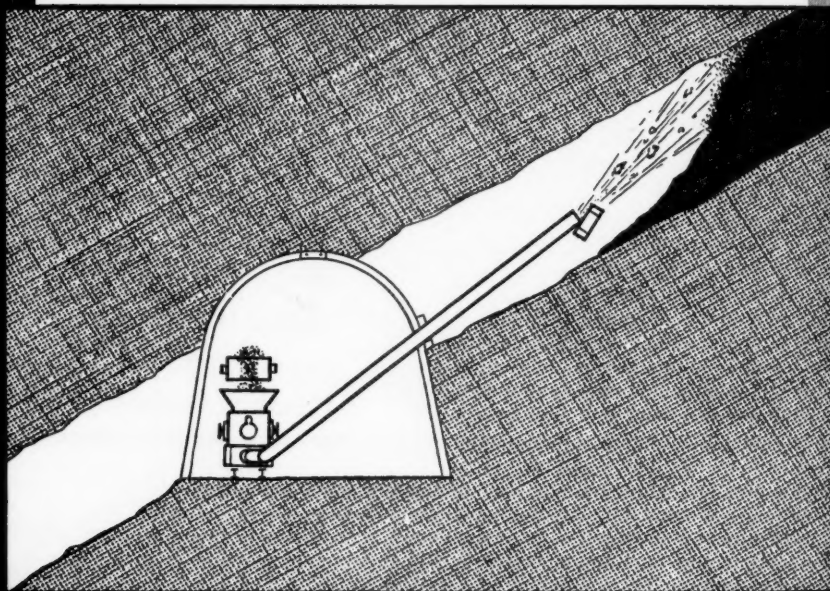


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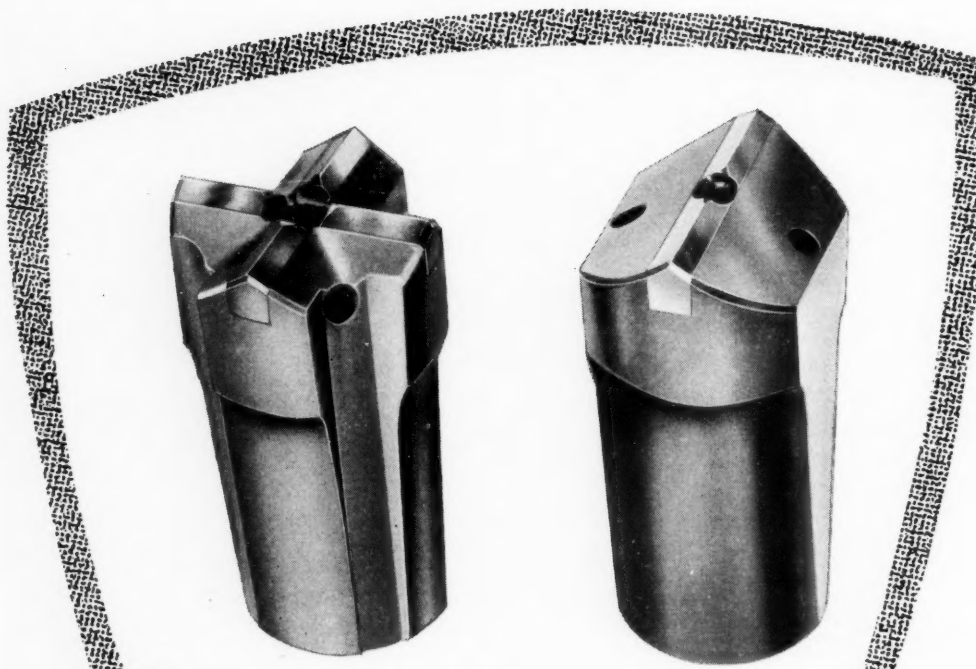


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# The Mining Journal

London, October 28, 1960

## In this issue . . .

Russia Ships Less Tin	467
Australia to Withdraw from Mica Marketing	468
Tanganyika's Search for Minerals	468
Mineral Projects in Brazil	468
Mining in Poland's Coming Five Year Plan	469
The 1960 Convention of the American Mining Congress	470
Segregation in Copper Recovery	472
Research on Gold Mining Projects	473
Machinery and Equipment	475
Mining Miscellany	476
Metals and Minerals	477
Mining Finance	479
Company Meetings	480
Coming Events	482
Professional Directory	484
London Metal and Ore Prices	cover iii

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## Russia Ships Less Tin

**A** FEW months ago, when export quotas for the first quarter of the year were raised to 36,000 tons, it was anticipated that on this basis the Free World supply for 1960 would be in the region of 169,000 tons, made up of 144,000 tons from the six producer members of the I.T.A., 11,000 tons from smaller producers, and 14,000 tons exported to non-Communist countries from the Soviet sphere. Against this, the probable Free World consumption was placed at 160,000 tons, indicating a surplus of about 9,000 tons.

It has since become increasingly apparent that, on the one hand, consumption had been under-estimated while, on the other, too high a figure had been placed on probable world supply. American tin consumption has been falling and at the present level is now about 20 per cent lower than six months ago, a decline of about 1,000 tons a month. Elsewhere, however, consumption has been steadily rising. Vivian, Younger and Bond, Ltd., in their August-September, 1960, review, estimated that the year's total consumption would probably amount to at least 165,000 tons against a total world supply of 163,000 tons, indicating a probable tin surplus of 2,000 tons.

Now, A. Strauss and Co., in their October review, consider that for the world as a whole, tin consumption is probably running at a rate of about 170,000 tons a year. On the supply side, apart from the failure of at least two I.T.C. countries to fulfil their basic quotas, shipments from the U.S.S.R. to Western Europe have dwindled in recent months. According to A. Strauss and Co., if the present trend continues, Russian tin exports for the year will be scarcely half the permitted figure of 13,500 tons on which computations of world supplies are usually based. Even after taking into account the rising trend of direct exports from China, it looks as though there will be a considerable shortfall in anticipated supplies from Communist sources during the year, which may amount to between 3,000 and 5,000 tons. It remains to be seen whether, now that all restriction has been removed, the deficit currently indicated can be made up by higher production and sales of stocks.

There has indeed been an astonishing transformation in the situation since September, 1958, when the rising tide of exports from the U.S.S.R., and to a lesser extent from China and Poland, threatened to submerge the International Tin Agreement. Total exports into Europe from the Communist countries rose from 8,400 tons in 1957 to 20,500 tons in 1958, of which Russia accounted for 8,000 tons and 18,000 tons respectively. The flood was stemmed initially as a result of import controls imposed by consumer members of the Council and subsequently by the agreement limiting Soviet exports of tin to the West to a maximum of 13,500 tons. Last year imports of tin to Western Europe from Russia fell to 10,000 tons while those from China and Poland increased further to 3,000 tons.

Now the pendulum of Russian exports has swung so far in the other direction that the shortfall from this source may yet prove an embarrassment to the I.T.A. It would, of course, be ludicrous to suspect that Russia, which showed such readiness to play ball with the I.T.C. in restricting its exports, should now be engaged in some Machievellian scheme to disrupt the market by creating an artificial shortage! Nevertheless, the reasons for the fluctuations in Russian tin exports have always been something of a mystery to the West. The steep increase in shipments, which became fairly substantial in the last quarter of 1957 and continued throughout the first three-quarters of 1958 at an accelerating rate, may have been due to the liquidation of stockpiled metal, to a growing surplus of total Russian supply (domestic production plus imports) over domestic consumption, or to a combination of both factors. Though some divergence of opinion exists between leading Western authorities as to the precise extent of current production, it is known that output has increased very substantially in recent years (*vide The Mining Journal*, April 1, 1960, p. 382 and September 16, 1960, p. 306).

Part at least of the Russian metal exported to the West is believed to be Chinese tin further refined in the U.S.S.R. and re-exported. The Economic Commission for Europe, in a report on east-west trade in Europe, states that Soviet tin exports to all markets in 1958 and 1959 equalled Soviet imports of tin from China, from which it might be inferred that Soviet production approximately covered domestic requirements. On this assumption, the decline in Soviet shipments to Europe, coming at a time when output, in accordance with the Seven-Year Plan, should have been further expanding, might be ascribed either to increasing domestic consumption or to a decline in imports from China. The latter assumption, however, seems to be nullified by the rising trend of direct Chinese shipments to the West, except in the rather improbable event of trade between the two countries being adversely affected by the deterioration in Russian-Chinese relations.

Chinese production has been increasing and by 1958 was estimated to have exceeded a rate of 25,000 tons annually, while Chinese consumption in the same year was estimated at 5,000 tons (*vide The Mining Journal*, May 6, 1960, p. 517). Even if, as seems probable, there has since been a marked rise in Chinese domestic consumption, the margin still available for export must be very large.

Whatever the reasons for the present decline in Soviet shipments to Western markets, the slight draught created by the shortfall from this source of supply is perhaps the first indication that, sooner or later, the Communist countries, despite their immense mineral resources, may eventually be obliged to reserve their entire production of many more metals and minerals for their own expanding needs and to compete into the bargain for available Free World supplies.

#### AUSTRALIA TO WITHDRAW FROM MICA MARKETING

The Australian Government has decided to cease commercial operations in the buying and selling of Australian mica. The Commonwealth Mica Pool, which is the Commonwealth agency concerned, will stop buying locally produced mica in December, 1960, after which the Pool will be discontinued as soon as practicable. This news was made public recently in a statement by Senator the Hon. W. H. Spooner, Minister for National Development, who pointed out that local production of mica had declined steadily. Production in 1955-56 was 50,000 lb. while in 1959-1960 it had fallen to 25,000 lb.

This fall is attributable to the decrease in the number of miners engaged. In 1954 there were 70 miners operating but at the end of 1959 there were 12 and recently there was only six. It is clear that the Pool is not succeeding in retaining an active mining industry.

The Tariff Board in its report on mica of June, 1958, recommended that the existing substantial level of protection by means of customs duty (27½ per cent on mica from India, the main supplier to Australia) be retained, but the Board opposed the request by mica miners for a subsidy on production. The Board also observed that it was doubtful whether continued operation of the Mica Pool was justified.

In the two years since the Tariff Board made its report, further losses by the Pool and the continued decrease in the number of miners have lessened the case for continuation of the Pool. The Cabinet therefore decided that defence considerations no longer justified retention of this legacy of war-time activity by the Commonwealth.

#### TANGANYIKA'S SEARCH FOR MINERALS

It has become evident, states the Geological Survey Department of Tanganyika in its annual report for 1959, that the stage to which geological investigation must be carried before mining companies become interested varies with the economic, political and other circumstances. There are, therefore, periods when the work of the Geological Survey must be extended beyond its basic function of geological maps, to cover not only the investigation of specific deposits but also regional mineral surveys, with the production of mineral maps. It is believed that the present situation requires this extension of function. Mining companies are today reluctant to embark on costly large-scale projects of lengthy duration in little known areas, such as those on which Western Rift Exploration Co. and BP-Shell are now engaged.

There are good hopes of finding fresh mineral deposits of economic importance within Tanganyika, states the report; the geological structure and mineralization of large areas are virtually unknown, except in a very general way. Emphasis in the past has tended to be placed on the search for minerals which have been found to occur in southern Africa and adjoining territories, mainly gold and base metals. However, the presence of carbonatite bodies containing pyrochlore and other metals; the possibility of new diamondiferous deposits, both as kimberlite bodies and alluvial deposits; the widespread occurrence of copper mineralization; the unusual deposits of phosphates within dischargeless lakes; salt, gypsum and other non-metallics in colossal amount; limestones and clays for cement manufacture and many other deposits which could support local industry, give hope that the mineral development of this territory will make a significant and material change in the national income.

#### MINERAL PROJECTS IN BRAZIL

A company has been formed in Paraiba, north-east Brazil, to exploit extensive phosphate beds on the coast, reports our Brazilian Correspondent in a survey of recent mineral projects.

Metalurgica Inga has completed plans to instal plant and produce metallic zinc in Minas Gerais; abundant electric power will be available from the hydro-electric station at Tres Marias in 1962.

Companhia Brasileira de Alumínio, founded by the Ermirio de Moraes industrial group, has leased a bauxite deposit from the Belo Horizonte municipality and will

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build plant to produce aluminium at Pocos de Caldas. The American Associates of Cia. Nacional de Alumínio (see *The Mining Journal*, July 29, 1960), will subscribe part of their share of the capital in equipment.

F. A. Sievert, president of Alumínio do Brasil, a subsidiary of Aluminium Limited of Canada, recently stated that Brazilian production of aluminium would reach 40,000 tonnes in the near future. Cia. Alumínio de Minas Gerais, subsidiary of Alumínio do Brasil, is increasing output from 10,000 to 19,000 tonnes. Brazil produced 16,000 tonnes of aluminium in 1959 and imported 9,314.

The establishment of a plant for the chemical treatment of zirconium-uraniferous minerals at Pocos de Caldas was reported in *The Mining Journal*, March 4, 1960. In this connection it is noteworthy that the immediate local de-

mand for zirconium is increasing. Ceramica Sao Caetano is producing zirconium bricks in Sao Paulo; alloys containing 20 per cent Zr are being used to purify cast steel; consumption of zirconium oxide by the Brazilian paint and tanning industries is increasing. Exports of zirconiferous concentrates are also on the up-grade, having risen from 2,000 tonnes in 1958 to 5,000 last year.

S.A. Mineracao da Trindade, founded in 1939 and re-organized in 1953, has inaugurated the following improvements in its Minas Gerais mines and plants: Alegria, Ouro Preto (iron and manganese ore), 2,314 m. of new galleries; Agua Limpa, Santa Barbara (ferro-manganese), 400 m. of new galleries; Fazendao, Mariana (bauxite), 40 pits for prospecting; Corrego do Meio, Sabara (iron ore), 6 miles of access roads.

## Mining in Poland's Coming Five-Year Plan

THE Polish Institute of Geology has announced on the occasion of its 40th anniversary plans for concentrated mineral prospecting in Poland over the coming years. Under the coming Five-Year Plan, 1961 to 1965 inclusive, production of phosphates in Poland is now planned to reach an annual level of 400,000 tonnes by the target year. This is an alteration in existing plans, by which phosphate mining was to have been running at only 360,000 tonnes a year by 1965. By this same year mechanical coal mining will account for 43 per cent of all coal mining, as compared with a share of only 33.7 per cent last year. At the same time mechanical coal loading will be increased from only 22.4 per cent of the national volume to over 30 per cent. These points are made in the latest report from our own correspondent in Poland.

Further rationalization foreseen under the Five-Year Plan will result in output per worker of pig-iron in Poland reaching 1,650 tonnes annually by the target year, or 70 per cent over the present figure, while coke consumption in blast furnaces is reduced to 870 to 900 kg. per tonne and fuel consumption in the steel industry by 15 to 20 per cent on current level to only 200-210 kg. per tonne of steel.

Despite the improvements in the coal industry, coal exports will fall over the plan period to only 14 per cent of total exports, as compared with a previous share of 41 per cent, due to unfavourable price prospects. Coal export value is expected to fall from a former annual level of 1,498,000,000 zlotys to only 910,000,000 zlotys in the plan's terminating year. The export rate is already falling, that for 1959 being at 16,000,000 tonnes, 1.2 per cent down on 1958. This falling export programme is in the face of investment totalling 22,000,000,000 zlotys made in Poland's coal industry over the past 15 years.

Of sovereign importance over the 1961-65 plan period are the mineral trading arrangements with Poland's most powerful ally, the Soviet Union. Over the five year span Russia is to export to Poland products including as much as 33,500,000 tonnes of iron ore, 1,095,000 tonnes of manganese ore, 500,000 tonnes of pig iron, 200,000 tonnes of various rolled goods, 2,000,000 tonnes of coking coal, 1,670,000 tonnes of apatite, 8,500,000 tonnes of mineral oil, 7,700,000 tonnes of oil by-products and "considerable quantities" of copper, aluminium, zinc, lead and other minerals. In the same period Poland plans to export to Russia 23,800,000 tonnes of coal, 3,000,000 tonnes of coke, 300,000 tonnes of zinc, zinc alloys and zinc sheeting, 600,000 tonnes of calcinated soda and other products.

An important expansion in Poland's copper industry is planned within the plan's framework. Latest exploration by the Lower Silesian Geological Institute for Metallurgy

has shown the deposits in the Lignice area to be among the biggest in Europe, while the Polish Minister for Heavy Industry, W. Czachowski, recently announced that first quantities of copper ore would be mined from the Lubin deposits during 1964, the Lubin mines to be brought up to full capacity by 1966 to 1967. Mines for as many as fifteen other metals are reported to exist in the same area. A sum of 2,000,000,000 zlotys has been made available by the country's government for the opening up of non-ferrous metal ore reserves in Poland over the next five years.

To be opened well after the end of the next plan is the new aluminium plant at Konin, which, with an annual capacity of 100,000 tonnes, will be one of Europe's biggest. Poland's existing aluminium plant at Skawina produces only 25,000 annual tonnes. The Konin plant, to be fed with 240 to 260 kW. from the nearby Konin power complex, is planned to be opened in 1969-70.

Lead and zinc output in Poland is reported to be making slow but steady progress. Figures for 1959 output show a production of 35,100 (1958: 33,100) tonnes of lead (mined) and 38,700 (35,800) tonnes of smelter lead, as well as 128,000 (123,000) tonnes of zinc (mined) and 168,100 (162,600) tonnes of smelter zinc. Mined zinc output is, however, still below the 1957 level of 131,000 tonnes. From such figures as are already known for the first half of this year, lead zinc ores are shown to have totalled 1,185,000 tonnes over the six month period as compared with only 1,067,000 tonnes over the first 1959 half-year, while zinc production rose over the period from 83,000 tonnes to 87,000 tonnes.

Other Polish production figures released for the first half of 1960 (corresponding 1959 totals in parentheses) include: 825,000 (741,000) tonnes of copper ores, 11,400 (11,300) tonnes of refined aluminium, 4,500,000 (4,400,000) tonnes of brown coal, 51,600,000 (49,100,000) tonnes of hard coal, 1,000,000 (900,000) tonnes of iron ore, 2,200,000 (2,100,000) tonnes of pig-iron, 3,200,000 (3,000,000) tonnes of raw steel, 2,100,000 (2,000,000) tonnes of rolled steel and 5,800,000 (5,700,000) tonnes of coke. Polish coal production, which totalled 99,100,000 tonnes of hard coal last year, is now stated to be produced at a man-shift productivity of 1,404 kg. (as at February, 1960), productivity per faceworker per shift being said to have reached to 1,742 kg. by the end of 1959.

The Polish journal *Polish Perspectives*, published in Warsaw, gives national mineral exports for 1959 as including 5,800,000 tonnes of brown coal (11 per cent above 1958), 2,100,000 tonnes of coke (same), 90,000 tonnes of zinc and galvanized metal (same), 724,000 tonnes of ferrous metals (24 per cent up) and 21 per cent more calcined and caustic soda.

**S**MALL mining companies in Canada have had success in exploring for new mineral deposits through use of a syndicate method, it was stated by Karl J. Springer, Mining Exploration and Development Enterprises, Toronto. Employment of the newer methods of mineral prospecting requires expenditure of up to \$500,000 annually. For this reason it is necessary for a number of small companies to band together so that they can enter into several exploration operations.

## The 1960

Springer said that in this syndicate type of exploration venture no separate company is formed nor are any shares or units issued. He told the Mining Congress that in such agreements in which his company had participated, the companies allowed for four stages in exploration and development: (1) each company nominated a representative having full authority to act for it and they agreed to provide funds for an aerial survey; (2) upon completion of the aerial survey the group decided what funds were required to investigate by ground geophysical survey any anomalies located; at this point any partner not wishing to go ahead forfeited his interest to the syndicate and his interest divided among those that carried on; (3) each company continuing in the project provided funds; (4) if the continuing partners decided more work was warranted on any of the properties, a company was formed, and further financing provided by the sale of treasury stock. A lot of small Canadian companies are following this practice and even a number of larger mining companies.

### Management

Industrial engineering, a management tool for cutting and controlling costs, is being used at a rapidly growing rate by mining companies. Richard M. Stewart, director of mining research, and Stewart W. Hurlbut, senior research engineer, both of the Anaconda Co., said a survey of 23 mining operations showed that in many cases, however, the industry had not recognized the professional nature of industrial engineering and was "attempting to take a shortcut" by trying to do a professional job with inadequate use of professionals.

Properly trained industrial engineers are needed in larger numbers, they declared, to augment the staffs of technicians and engineers with other backgrounds. They suggested that the curricula of mining schools should include basic industrial engineering courses because, "unless a mining property can continue to operate at a profit, it is obvious that there will not be a place there for the mining engineer to practise his profession".

Work measurement programmes at mining operations are a live, active functioning of mine management and supervision, declared Benton Boyd, manager, U.S. and Lark Mine of the U.S. Smelting Refining and Mining Co., Salt Lake City. Such programmes should be developed from initially engineered studies, and careful periodic evaluation of these studies, combined with extreme flexibility of approach, will contribute greatly to the overall improvements realized. Boyd pointed out that such programmes not only result in cost improvements but in growing im-

provement in good human and labour relations and in mine safety. The main purpose of standards resulting from work measurement programmes is to measure manpower productivity it was stated. The programme must never be construed as a means to "speed up" work or for the establishment of unreasonable goals.

The Methods and Equipment Section of the Engineering Department of Climax Molybdenum Company's Climax mine in Colorado now utilizes the services of 19 engineers, compared to two when the section was formed in 1957, reported Charles A. Cleeves, assistant mine superintendent. The purpose of the section is to establish work standards for maximum practical coverage of the plant through use of time studies and other industrial engineering techniques and to improve methods and equipment for the Climax operations.

Coverage with work standards of underground mechanics is 50 per cent of the total hours worked, Cleeves said, with 80 per cent as the ultimate goal. Crusher mechanics are 60 per cent covered, with 75 per cent as the goal, and mill mechanics are 50 per cent covered with a goal of 75 per cent, he stated.

## Convention

There are certain maintenance jobs that may never be covered by work standards, including mine jobs such as hoistmen, toolroom men, mucking machine repairmen, and men on unusual and non-recurring repair jobs. In the mill, crane operators, toolroom men and, again non-recurring and emergency repair jobs have little to add to a standards programme.

### Safety and Health

The use of commonplace detergents to fill an underground mine entry or tunnel with bubbles of foam is a secondary fire fighting method by which many major mine fires can be averted if the foam is properly and quickly applied, a Lake Superior district mine official reported.

Bernard W. Carey, assistant superintendent of the Cary Mine of Pickands Mather & Co. at Hurley, Wisc., said the process by which the foam is produced is very simple. A dilute solution of detergent is sprayed on a coarse cotton net stretched across the mine entry, and if the net is kept saturated with the solution while the ventilating air current flows through the net, foam in the form of bubbles from one-half to one and one-half inches in diameter is very rapidly formed in the entry. These bubbles form a honeycomb and quickly fill the entire cross-section of the entry, continuing into the entry as long as air is forced through the saturated net, and tend to smother the fire as well as lower the temperature in the fire area.

This foam technique is not intended to solve the problem of deep-seated, widespread fires which have raged out of control for many hours, but is successful in controlling smaller fires to the extent that they can be extinguished by direct fire-fighting methods.

Dust control in American mines has resulted in the alleviation of individual hazardous dust conditions underground, but overall air conditioning is necessary to afford

a high degree of safety and efficiency, a Pennsylvania State University official declared.

Howard L. Hartman, head of the State's Department of Mining, said that too little attention in mining had been given to the simultaneous control of air purity, motion, and heat content. Control of only one or two of these properties of air "does not constitute air conditioning, nor does it guarantee satisfactory environmental conditions."

Hartman suggested that the mining engineer, in his haste to correct a local gas, dust, or heat problem underground, "tends to overlook the side effects on other working places in the mine or to relax vigilance in control of some other aspect of the miner's atmospheric environment." Air conditioning—simultaneous control of the three properties of air—not only benefits working conditions and increases productivity, he stated, "but more efficiency in the air conditioning system is certain to be obtained."

### Open-Pit Mining

Open-pit uranium mining operations in the Gas Hills area of Wyoming, where uranium was discovered in 1953,

## the American

have grown at a pace which, during 1959, resulted in the production of some 825,000 tons of ore, according to Roy Coulson, division superintendent, Vitro Minerals Corp., Riverton, Wyo. To attain that production figure, Coulson said, more than 1,100 men were employed and nearly 25,000,000 cubic yards of waste were moved—over five times the waste moved in 1957.

Mining of the ore is complicated, because it occurs in spotty lenticular pods and its colour and physical makeup are not much different from those of the rock surrounding it and radiometrically it can be out of equilibrium in either direction. Front-end loaders, shovels and backhoes used to load ore are controlled by an ore-control man using a counter it was stated. Operators work around ore pods with the front-end loader and shovel, removing the waste material first and then the ore. The backhoe is used to dig out the narrow, sinuous ore channels as cleanly as possible.

Charles L. Boise, assistant superintendent, Isbell Construction Co., Sahuarita, Ariz., said that layout was one of the prime factors in any open-pit operation where minutes, or even seconds, mean the difference between profit and loss. Maintenance personnel spend valuable time moving to equipment that requires attention, he said, and shops should be located for easy access to the pit in a minimum of time without hampering the efficiency of the total mining operation.

Some temporary installations must be provided to supply moving portions of the operation, but advantageous location of permanent installations, even if initially more costly, can result in overall economies in maintenance work by saving many man-hours.

Premature failure due to excessive heat is the most prevalent tyre problem of mining companies using off-highway trucks and other earthmoving equipment in open-pit operations, according to G. E. Danby, manager, Sales Development, Euclid Division, General Motors Corp., Cleveland, Ohio.

Discussing the "Economics of Large Tyres for Earthmoving Equipment," Danby said that tyre replacement cost increases at a faster rate than the increased investment required for larger vehicles. He also noted that the replacement cost of a tyre per thousand pounds of load-carrying capacity increases at a faster rate than the increased ply rating yields extra load capacity. To obtain longer tyre life, he suggested the building and maintenance of good haul roads, which permit vehicles to travel at high speeds and thus increase productivity. He also said that loading and dumping areas should be kept clear of sharp or abrasive rocks that may snag and cut tyres, and he emphasized the value of regular, thorough inspection and maintenance of tyres. The usual practice of overloading vehicles and tyres well beyond their rated capacity, combined with a modern off-highway hauler's ability to travel in excess of 30 miles an hour, shortened tyre life and increased haulage costs.

### Underground Mining

Various mining methods used in extracting more than 1,000,000 tons of ore annually from Sweden's huge iron ore deposits at Kiruna, Malmberget, Grangesberg and Strassa were described by a Swedish mining expert, I. Janelid, professor of mining at Stockholm's Royal Institute of Technology, who said great efforts had been made to "rationalize" the subterranean operations by mechanization, remote control, and automation, and he foresaw the development in large mines of a haulage system controlled by means of a data-processing machine.

Sub-level caving is at present the predominant mining method, but block caving will probably become more common, especially in connection with deep-level operations. In the blasting field, the use of ammonium nitrate in small drill holes underground has met with considerable interest and has given very good economic results in connection with special charging units for powdered explosives. To raise the output per man underground, working operations are predetermined as far as possible with long working cycles and short moving times.

## Mining Congress

The 1960 meeting of the American Mining Congress was held at Las Vegas, Nevada. Brief summaries of a few of the papers are here presented

Scrapers are being successfully used in removal of fluorspar ore from narrow veins by drawing ore from the top of stope piles.

William H. Harrison, Jr., general mine superintendent, Aluminium Co. of America, Rosiclare, Ill., described development of the slusher system at a session on underground mining. Several difficulties were encountered, he said, because stope widths are as narrow as 30 inches and the footwall and hangingwall are very irregular in many places. The vein is sinuous, and the slusher operator could not always view his scraper even a short distance from his

station. Despite the difficulties, the adaptation of slushing to shrinkage stoping in this mine has improved the safety of operating conditions in stopes, increased efficiency and flexibility, and reduced considerably the cost per ton of ore mined.

Scheduled preventive maintenance of rock drills, vital equipment in maintaining production in underground metal mines, is one method of preventing costly breakdowns, said Raymond Stewart, chief industrial engineer, Climax Molybdenum Co., Climax, Colo.

Scheduled maintenance requires records for its installation and effective application, but in some companies it is entirely possible to accumulate and process the necessary data in conjunction with other information without using more clerical or supervisory employees.

Cost of maintaining required information must also be weighed in view of important advantages it can serve other than the primary reason of maintenance control. These advantages are financial forecasting, systematic replacement, engineering changes, purchase policy, factual machine comparison, and inventory control.

Analysis of this information may be handled by someone in the company who is a specialist in this field of work, but decisions made as a result of the analysis are up to the people responsible for maintenance cost control.

### Blasting

A new type of detonating cord which results in materially less noise and vibration in open-pit mine and quarry blasting operations is now being tested in various parts of the U.S. H. J. Poel, manager, technical service section E.I. du Pont de Nemours and Co., Wilmington, Del., said the new cord was developed to reduce annoying noise and

vibration resulting from blasting adjacent to residential or other populated areas. This low energy detonating cord contains only 2 grains of explosive per foot, and is virtually noiseless when compared with ordinary detonating cord containing from 40 to 60 grains per foot.

Another development for initiating blasts is primarily of interest in underground mining, Poel reported. "For the first time," he said, "precisely timed, regular-delay electric blasting caps are available. All caps of any given period will fire before any cap of the next period, so that there is no overlapping. This new series of caps has given better fragmentation in virtually every operation in which it has been tried and has also provided better control of over-break in tunnel and drifting rounds."

Mining companies have displayed great ingenuity in devising more economical methods of mixing and handling ammonium nitrate-fuel oil mixtures used as a blasting agent in open-pit operations.

Donald M. Stromquist, technical representative, Coal Chemical Sales Division, U.S. Steel Corp., Salt Lake City, Utah, said that many mining companies had put in bulk-handling systems to take advantage of the price differential between bulk or carload quantities and bagged ammonium nitrate.

One Utah company loads ammonium nitrate from an overhead storage bin into a truck which hauls it to blast-holes previously drilled in the rock. From the truck, the AN is fed into a measuring container and sprayed with oil before it falls into the blasthole. Another Utah company uses two truck-mounted concrete mixers to which oil tanks and distribution systems have been added. The oil is sprayed into the rotating mass of AN and excellent mixtures are obtained in less than 10 minutes, he reported. Holes are loaded from the chute at the rear of each mixer.

## Segregation in Copper Recovery

THE segregation process, originally developed in London by Mineral Separation about 35 years ago, is now being re-examined. The U.S. Bureau of Mines is currently operating an externally fired rotary kiln on a semi-technical scale, and a similar pilot plant is in operation in Mauretania at the d'Akjoujt mine. A ton-an-hour pilot plant is also in operation at the Berenguela mine in Peru, which is owned by a British company, The Lampa Mining Co. Ltd. At this mine both copper and silver are being extracted from a low grade ore containing 1 to 2 per cent Cu. and 5 to 20 oz. Ag. per tonne which is also manganiferous.

Unlike many copper ores, most of the copper is not present as recognizable minerals but is associated with the manganese oxides. The mixed charge of ore, coal and salt is ground finely, pelletized and calcined in a multi-shaft furnace, the pellets being heated by direct contact with neutral hot combustion gases. The copper is subsequently separated by flotation after water quenching and a light grind, when an overall copper recovery of 80-85 per cent is normal.

Experimental work at Berenguela has apparently established that sodium chloride is essential but as little as 0.5 per cent allows the reaction to proceed to completion. Furthermore, oxygen must be excluded and solid reducing agents are used, since gaseous reduced agents fail to provide nuclei for the precipitation and growth of copper crystals from the cupreous chloride vapour. The copper is floated with xanthate and pine oil and flotation is rapid

and very efficient, and since the silver also segregates well, a good recovery of this element is also made.

Unlike the plant in Katanga (see *M.J. Annual Review*, 1960, page 149), which used a direct fired rotary kiln to preheat the ore up to the segregation temperature and then transferred the ore to another kiln to which the coal and salt was added, the Berenguela plant utilizes pelletizing and then heating the pellets in oxygen-free products of combustion and cooling by quenching in water. A shaft calciner was chosen as that most suited to the heating and quenching process whilst experiments showed that  $\frac{1}{2}$  in. pellets were satisfactory.

Unlike this method, a huge stainless steel indirect fired calciner has been built by Standard Steel Corp. for work in America's south west copper industry, which is 48 ft. long and 54 in. in diameter.

At Berenguela it is claimed that the process has now been established as being both economic and efficient in continuous operation. Compared with leaching processes, the segregation method has apparently a lower capital cost and calcareous ores may well be a field in which this process could be better than leaching. It has also been suggested that segregation processes could be used for chrysocolla and carbonate copper ores as well as mixed oxide-sulphide ores. It might even be used for other ores such as those of lead, antimony and bismuth and indeed possibly any containing elements which form volatile chlorides or oxychlorides.

**GOLD MINING RESEARCH — II**

# Research on Gold Mining Projects

**T**HE list of research projects presently being undertaken directly in the Chamber's various laboratories is a long one and only some of these activities are enumerated in Mr. Findlay's paper.

## The Dust and Ventilation Laboratory

Some of the work proceeding in this Laboratory at the present time is as follows:

An operational team is engaged on underground work to determine the individual sources of dust, their relative importance and what improvements in dust conditions can be made by improved air control and dust suppression methods.

Electron microscope studies are being carried out in an endeavour to gain knowledge on the characteristics and distribution of sub-microscopic particles in underground air.

Investigations are being carried out to establish the best method of determining the surface area of small particles, since it has been suggested that the toxicity of silica dust in regard to the production of pneumoconiosis is a function of the surface area of dust particles.

As a result of the greater refinement now demanded in measuring the concentration of dust in mine air, intensive work is being carried out in developing and producing automatic dust particle counters and specialized dust sampling instruments which, for their purpose, are superior to anything else so far produced. A specialized piece of equipment operating on the principle of differential thermal analysis has now been completed and is capable of determining rapidly and accurately the proportion of quartz dust in a sample of dust in mine air. It is believed to be in advance of any instrument of its kind.

Investigations are proceeding on the age-old problem of reducing dust underground by modifying rockdrill machines and by the filtration of dust from blasting operations. The use of salt aerosols as a means of removing dust from air underground is also being tested.

The Laboratory is conducting a considerable amount of research into ventilation problems which includes investigations into:

- (a) The laws governing the flow of heat from surrounding rock into the air in underground workings. The solution of this problem will enable greater precision to be used in calculating the ventilation requirements of deep mines.
- (b) The extraction of noxious gases from diesel exhaust fumes and blasting fumes and the development of simple and accurate testing methods for determining the concentration of these and other gases in mine atmospheres.
- (c) The question of shaft resistance to air flow. The results of this work, which is being done in collaboration with the C.S.I.R., should make it possible to design shaft equipment with minimum air resistance and thus improve ventilation underground.

Investigations are being made in regard to the occurrence and behaviour of radon gas in mines and the degree of radioactivity in mines and uranium plants. Although concentrations of radon gas and the degree of radioactivity in South African gold mines are extremely low and are,

*This is the concluding instalment of a survey of research in the South African gold mining industry, abstracted from the presidential address of Mr. W. S. Findlay to the South African Institute of Mining and Metallurgy, delivered on August 24, 1960 and published in the August issue of the Institute's Journal*

in fact, well below the level that is currently accepted as a hazard to health, the dangers associated with work in close proximity to uranium, both underground and in treatment plants, are not yet fully known. The information so far obtained indicates that there is very little likelihood that any hazard exists. Despite this, elaborate precautionary measures are being taken to ensure the minimum exposure of personnel to any known hazards. As an additional precaution, workers in uranium plants are required to undergo frequent medical examinations in order to guard against the possibility that harmful material may have been absorbed. The Laboratory also conducts regular surveys of silica and uranium dust concentrations in uranium plants and concentrations of radon gas and its daughter products underground.

A further investigation in this field involves the application of radioactive tracer techniques to selected mining, dust and ventilation problems.

## The Biological and Chemical Research Laboratory

In this Laboratory work is at present proceeding on:

1. Refinements in the techniques of preservative treatment of timber;
2. the development of fire-retardant coatings for timber and the fire-proofing of fabrics;
3. the bacterial leaching of material from low-grade uranium ores;
4. the treatment of uranium plant effluents for the recovery of valuable materials;
5. the development of techniques for gas analysis in mine atmospheres;
6. assistance to the Pneumoconiosis Research Unit in connection with
  - (a) the examination of amino acids in healthy and dusted lung tissue; and
  - (b) the effect of dusting on certain enzyme systems in lung tissue;
7. the screening of fungi for substances having antibiotic properties. The extraction and purification of several such substances is presently being undertaken; and
8. under the aegis of this Laboratory an extensive investigation is now being conducted into the possibilities of establishing plant life on mine tailings dumps in order to abate dust nuisance. The results so far achieved in this investigation are promising.

## The Applied Physiology Laboratory

Research into human physiology in mines is being carried out at the Chamber's Applied Physiology Laboratory in conjunction with observations made under practical working conditions on the mines. The major projects are:

1. The assessment of the effects of hot conditions on the rate of work which Native mine labourers *can* maintain for an average shift;
2. the estimation of the influence of hot air conditions on the level of work which Native mine labourers *will* maintain for an average shift. This limit is set by a complex of psychological causations termed "motivation";
3. further studies on means of acclimatizing Native labourers to conditions of heat and humidity; and
4. the development of simple practical tests which can be applied to recruits to the mines and which will give an index of their maximum work capacity. These tests, if successfully developed, should aid in correct job placement and are therefore complementary to aptitude selection.

This Laboratory has built an experimental climatic chamber in which the exact environmental conditions of heat and humidity met with underground can readily be reproduced and maintained accurately over long periods, thus enabling basic physiological experiments under those conditions to be carried out. This plant is probably the only one of its kind in the world.

Among the many projects under investigation by the Laboratory is the development of means of direct measurement of convective and radiant heat exchanges from the human body. A full-scale model man has been developed in order to study these problems.

#### Research on Rockbursts and Strata Movement

For some years now the Chamber has been conducting research into the phenomena of rockbursts in deep mines and into ways of reducing their incidence and severity. This work, which has been done in close collaboration with the C.S.I.R., consists of laboratory and theoretical studies of the properties of rock and the distribution of stresses around mining excavations. Practical observations are also made underground to test theories developed. Complementary to this work, extensive investigations of strata movement from underground workings up to the surface have also been started and a considerable amount of data is being collected on selected mines.

#### Shaft Plugs

After a concrete plug, installed in an Orange Free State gold mine to contain an inrush of water, had failed, the Chamber of Mines, in conjunction with the University of the Witwatersrand, the C.S.I.R. and the Cementation Company of South Africa, undertook investigations in laboratories and underground to obtain more information on the strength of concrete plugs and bulkhead doors and of the rock in which they are installed in mines.

#### Buntons and Guides

Investigations are proceeding with the assistance of the University of the Witwatersrand, the C.S.I.R. and the engineering departments of individual mining groups into the behaviour of steel buntons and guides used to equip modern shafts and into problems relating to rope guides.

#### Winding Ropes and General Mining Research

In close collaboration with group engineering departments investigations are proceeding into the design and use of electro-magnetic equipment for accurately locating any flaws that might occur in winding ropes (without the need for physical testing).

Arrangements have recently been made for the establishment of a small team of high-level technical experts by one of the groups to conduct operational research on mines into various mining problems. Since mining methods depend so much on variable physical conditions and on the machinery available, research will in the first place be concentrated on the development of improved machinery. The industry has undertaken to provide financial support.

#### Services to the Mines

The research laboratories of the Chamber, in addition to the more important lines of investigation mentioned, also carry out numerous smaller projects of interest to the mines and provide the mines with many services which could not easily be undertaken by other organizations or by commercial firms. Such services include dust sampling under special conditions, the checking and servicing of konimeters, microscopes and other instruments, the provision of specialized dust sampling equipment, the administration of acclimatization training, lectures on and examinations in dust prevention and the checking of timber treatment plants, and so on.

#### Expenditure on Research

The research policy of the industry endeavours to take full advantage of the unique set-up which exists whereby a large number of separate and completely autonomous mining companies are able to pool their technical knowledge and provide the necessary facilities and expert advice to advance the knowledge of mining in all its aspects on a common basis. This is only possible because the companies are not in competition with each other and can therefore act in unison for their common benefit. By this means the best mining brains in the world can be brought to bear on our problems. Where the task is one which calls for knowledge or experience outside the orbit of the mining man, the best facilities in the country are brought to bear.

The considerable research effort of the industry is consequently widely spread and, for this reason, may not appear as impressive as it would if it were concentrated into one organization such as a mining research institute. Some idea of the industry's effort may, however, be gained from the amount of money which it expends on research.

During 1959, for example, the cost of research paid for by mining members of the Transvaal and Orange Free State Chamber of Mines was as follows:

(a) Cost of researches under the direct administration of the Chamber ..	£ 305,000
(b) Contribution to the Pneumoconiosis Research Unit .. .. .	53,000
(c) Contribution to the Atomic Energy Board .. .. .	400,000
(d) Contribution to research at universities, etc. .. .. .	33,000
(e) Cost of research undertaken by individual groups and mines .. ..	913,000
	<hr/> £1,704,000

This figure takes no account of the very large sums expended annually by the groups on another form of "research", namely the search for occurrences of economic orebodies in the earth's surface. The total cost of such efforts in a normal year is probably as great as or even greater than, the cost of research into problems affecting the actual exploitation of established gold mines.

## Machinery and Equipment

## The Hydraulic Armadillo

With the introduction of modern direct oil pumping systems and compact large power weight ratio motors, hydraulically driven conveyors became a possibility and, in 1951, a conventional 25 h.p. face belt drive head was converted to hydraulic drive. It was late in 1958 before the first attempt was made to transmit a large horsepower or to transmit hydraulic power through long pipelines; this was the beginning of the hydraulically driven Armadillo—now proved and in production. Prior to this development compressed air was the only alternative source of power on the face when electricity could not be used.

The use of hydraulic power is much cheaper than the use of compressed air. Hydraulic transmission is achieved by circulating oil from a pump to a motor, both of which are identical in design. The system works on a closed circuit and an oil tank is included to allow for cooling and oil expansion.

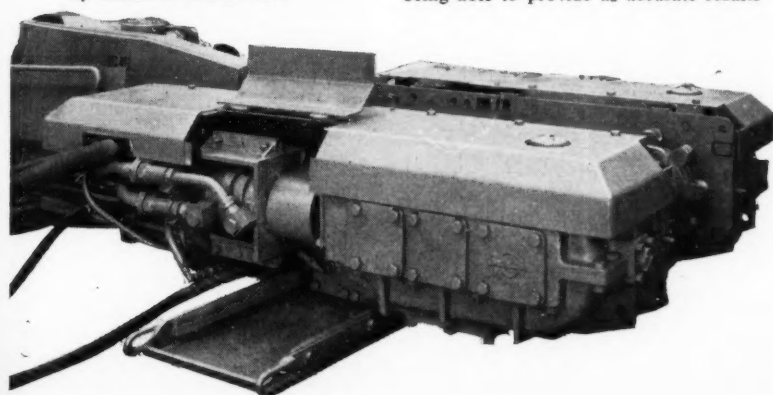
The pumping set is separated from the driving head by 100 yds. of pipes and so four pumps are used to drive one hydraulic motor, their outputs being brought into the feed line in pairs so that the oil is accelerated in two stages. This also allows the motor to be run at two speeds. The power pack consists of a 250 gal. steel tank fitted with wheels suitable for running on the tub track.

On the same track adjacent to the tank are fitted the pump bogies one at the front and one behind; each consists of a double pump unit, each pump having an output of 28 g.p.m. Mounted at the rear of the set is a pilot pump of 4 g.p.m.

There are a number of very important safety aspects with the hydraulically driven Armadillo.

The machine is very much smaller in size and requires only 35 sq. ft. of floor area compared with 56.5 sq. ft. for the air driven machine. This means that the prop setting can be much closer—5 ft. 4 in. compared with 6 ft. 4 in. when a compressed air drive is used. Stopping time is also very greatly reduced. The hydraulically driven Armadillo will stop within 2 ft. of travel. The machine is quiet in operation and there are no exhaust vapours. The

The hydraulic Armadillo face conveyor by Richard Sutcliffe Ltd.



hydraulically driven machine affords the same degree of visibility as can be expected from electric motors.

## SAFETY STANDARDS FOR HELMETS

A new technical committee of the International Organization for Standardization (ISO/TC 94) dealing with protective helmets, held its first meeting at British Standards House, London, from October 12-14, 1960. The committee, of which the British Standards Institution holds the secretariat, has been set up to prepare international recommendations for the quality and performance of helmets designed for protection against physical injury to the head.

More than 40 delegates from Czechoslovakia, Denmark, France, Germany, India, Italy, New Zealand, Pakistan, Poland, the U.K. and the U.S. attended the meeting, at which it was decided to form two working groups, one of which will deal with requirements for industrial helmets, and of which Germany has been appointed the secretariat, and the other (secretariat, U.K.) with requirements for road users' helmets.

The collaboration of the various delegations at this meeting was excellent.

It was agreed that the requirements to be covered, with methods of evaluating these requirements, should include protection against impact and penetration and the ability of the helmet to withstand a degree of heat and moisture without deterioration. In regard to impact and penetration, there was agreement that only test methods capable of giving a quantitative measurement of shock absorption and of resistance to penetration should be developed and that these methods should be selected as being able to provide as accurate results

Although designed primarily as a truck crane to handle booms up to 140 ft. in length, this newly developed machine by Harnischfeger Corp., United States, is adaptable with front-end attachments to work as a backhoe (above) or as a shovel, dragline, clamshell or pile driver. The machine here works with a  $\frac{3}{4}$ -cu. yd. bucket in excavation. The new 20-ton capacity unit is officially labelled a P&H Model 255B-TC truck crane and, with backhoe attachment, is capable of digging more than 21 ft. below ground

as possible. This is in itself a considerable advance, leading towards the abandonment of cruder methods which are used in some countries.

Established practice in a number of countries was recognized in that the method of measuring the indentation made on an aluminium bar when the shock is transmitted through the helmet to the bar under standard conditions was adopted as an initial basis. Since this was a first meeting most of the decisions were on matters of principle. The working group on industrial helmets has developed the basic content of a specification and has allocated the study of particular problems to individual experts in the group.

The recommendations to be developed by ISO/TC 94 in the near future will undoubtedly be of great significance in the world-wide campaign to reduce injury in industrial accidents.

## SHAFT SINKING AT COEUR D'ALENE

Shaft sinking methods and costs in the Coeur d'Alene mining district of northern Idaho are described in a new U.S. Bureau of Mines publication. Summarizing practices in drilling, blasting, mucking and hoisting, the Bureau's report also contains a detailed breakdown of performances and costs at 13 shaft sinking projects in 10 different mines. The shafts range in depth from 160 to over 2,000 ft. and have from two to four compartments. Some are vertical, some inclined. The seven companies controlling or operating the 10 mines gave statistical information to the Bureau as a service to the industry.

A major change in Coeur d'Alene methods is the replacement of hand shovelling by mechanical mucking. Recent innovations, including use of rock-bolted bearing sets, prepackaged timber, and steel blasting sets, have improved safety and efficiency. Most equipment, however, such as hoists, drills and ventilation and pumping machinery, remains essentially the same in principle.

# MINING MISCELLANY

According to Mr. M. Bader, director-general of the Ministry of Development, all Israel's mining and quarrying companies in the Negev showed a gross profit during the 1959/60 fiscal year, though not all are yet in a position to pay the full interest and dividends on capital. This year each of these companies will become a fully profitable enterprise.

\*

A plant has recently been opened at Somova in Roumania for the production of barytes. It will produce sufficient to cover domestic demand.

\*

Ceylon is to devote 5,000,000 rupees to the processing of mineral sands during the financial year starting October 1, out of a total of 60,000,000 to be spent on government-financed industrial development schemes.

\*

West Germany, the world's second largest potassium producer after the United States, now expects to increase her annual production by 4 per cent, and anticipates sales of 1,980,000 tonnes during 1960, compared with 1,800,000 in 1959. Exports are expected to be 40 per cent of production in the current year, compared with 37 per cent last year. The U.K. is the second largest customer for Federal German potassium, the main buyer being Japan.

\*

A delegation from Guinea headed by the Minister of Planning, Mr. Keita N'Samara, has arrived in Frankfurt-on-Main for the purpose of interesting German firms in ore exploitation in Guinea.

\*

According to a report issued by the Dutch Ministry for Economic Affairs in The Hague, a total of 260,000,000 florins has been invested in the Dutch mining industry, and a further 1,370,000,000 florins in the metal industry, over the period 1957-59 inclusive. These figures form part of an industrial investment total for the period of 5,950,000,000 florins.

\*

The foundation stone of a £500,000 tin-smelting company was laid in Jos, Northern Nigeria recently. It is reported that Nigerians will be able to contribute half of the shareholding in the new company, which will be known as Nigerian Embel Tin Smelting Co. (See *Mining Journal*, Sept. 16, p. 304).

\*

An agreement providing for a \$1,500,000 geophysical survey of Surinam has been signed between Surinam and the World Bank. The survey, which has been approved by the United Nations Special Fund, is to provide information on the possible existence of commercial minerals such as iron ore, titanium, copper, nickel and cobalt in Surinam. The fund has allocated \$770,000, and the government of Surinam, a constituent part of the Kingdom of the Netherlands, will bear the remainder of the cost.

Johns-Manville Corporation's Canadian subsidiary is joining Patino of Canada, Amet Corp. Inc. and Financiere Belge de l'Asbest-Ciment S.A., European consumers of asbestos fibre, to develop an asbestos orebody in Newfoundland, at a combined cost of \$18,000,000. The deposit has proved ore reserves of 22,000,000 tons, and is one of several in the Baie Verte region of the Burlington Peninsula, where the mineral rights are held by Advocate Mines, through a concession granted by the Newfoundland Government in 1955. Under the terms of the agreement Johns-Manville will put up 49.62 per cent of the money to bring the mine to production, and will purchase 10,000 tons of fibre from Advocate Mines annually for 10 years at the market price; Amet and Financiere Belge will put up 16.54 per cent, and will each buy 7,500 tons, and Patino will put up 17.3 per cent. The decision to go ahead follows two years of test mining and drilling.

\*

The U.S. Commodity Credit Corporation has announced changes in the rules governing the bartering of U.S. surplus commodities for strategic minerals with France and the Republic of the Congo. The Corporation has also announced that it is prepared to accept offers for all or part of 32,000 tons of ferromanganese produced in Chile for agricultural commodities.

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An electrolytic copper plant with an annual capacity of 10,000 tonnes of copper metal is proposed for Khetri in Rajasthan during India's third Five-Year Plan. Copper ore for this plant would be supplied from Khetri and also from Daribo areas, at present being prospected by the Indian Bureau of Mines. One zinc smelter of 15,000 tonnes annual capacity is being set up by the Metal Corporation of India at Udaipur, and should be completed by 1962. India's present requirements of copper, lead and zinc metals are estimated to be about 85,000 tonnes, 35,000 tonnes and 85,000 tonnes respectively, of which domestic production supplies 8,000 tonnes, of copper 4,000 tonnes of lead metals. Consumption of zinc metal is met entirely by imports.

\*

Trials were completed on October 12 of a new, modern flotation plant just east of the village of Madzharovo in the Khaskov District of Bulgaria, to produce lead, zinc, pyrites and copper concentrates. The plant will have an initial daily capacity of 500 tonnes of ore, but with the completion of a second ore-crusher, capacity should be doubled.

\*

A three-day symposium has been arranged by the Scottish Council (Development and Industry), from October 31 to November 2. The intention is to form a fact-finding group as a first step in an enquiry, which may last four years, on the natural resources of Scotland, and indicate future action of advantage to the Scottish economy as a whole. Among the subjects for discussion are minerals and their utilization.

Mr. H. Minagawa, Canadian representative of Mitsubishi Shoji Kaisha of Japan, told the delegates of the annual western meeting of the Canadian Institute of Mining and Metallurgy that Canada might expect to expand her sales to Japan in the next 10 years. Japan was considered a future major importer of western Canadian mineral production.

\*

The Belgian National Council of Collieries has decided to shut down 11 pits during 1961, representing an output of 1,748,961 tonnes. In a memorandum submitted by the Belgian Government to the European Coal and Steel Community, the coal output capacity to be suppressed was put at 2,000,000 tonnes for 1961. For the two years 1962-3, the Belgian Government proposes to suppress a capacity of 2,700,000 tonnes, thus reaching the set goal of 9,500,000 tonnes of output capacity to be annulled during the period 1959-63. The High Authority is to use a substantial part of a \$35,000,000 loan recently contracted with U.S. banks towards creating new industries in the Belgian coal mining areas of Borinage and Charleroi. The remainder of the loan is to finance coal and steel enterprises in France, Belgium and Italy.

\*

A new discovery of iron ore has been made near Achim in the West German State of Lower Saxony during a mineral oil prospecting project. This find follows similar discoveries in the Gifhorn and Nienburg areas of the same State. The dimensions of the reserves have not yet been ascertained. The ore is of poorer quality than that found in the Nienburg deposits, discovered two years ago, but it is considered that exploitation should be attractive owing to the nearness of the seams to ground level. The ores could be valuable as a feed for the nearby iron and steel works in Bremen.

\*

Yawata Iron and Steel Co. estimates that Japanese steel demand during 1960 will reach 13,400,000 tons, a 17.6 per cent increase over 1959. The Iron and Steel Industry Association estimates that Japanese steel production in 1970 will amount to 38,000,000 tons, of which 34,000,000 will be for domestic use. Three Japanese iron and steel firms are interested in a Peruvian offer to supply 3,500,000 tons of iron ore over 10 years in exchange for a 60,000 cwt. iron-ore carrier. It is further reported that 100,000,000 yen will be paid out during 1960 to 128 mining firms as prospecting and development subsidies, the biggest going to copper (43 firms getting 33,800,000 yen), followed by manganese, gold and iron ore.

\*

The Committee on Underground Power of the American Mining Congress has undertaken a project to determine the primary causes of trailing cable failures in underground mines. A questionnaire has been sent out to foremen in American mines, accompanied by an instruction book illustrating common cable failures. It is hoped that the collection of data will assist in the improvement of cable and machine design.

## Metals and Minerals

## Aluminium's Long-term Prospects "Never Better"

The primary aluminium industry in the U.S., increasingly aware that neither at home nor abroad will 1960 demand measure up to earlier expectations, has gradually been reducing its production schedules. According to *American Metal Market*, these are now geared to produce something like 2,000,000 tons of new metal during the current year, which is 5 per cent more than is needed.

Nevertheless Alcoa's capital expenditures will amount this year to about \$85,000,000 against \$55,000,000 in 1959 and this figure is expected to be equalled or exceeded in 1961. According to the company's president, Mr. Lawrence Litchfield Jr., the future of the aluminium industry over the long term has never looked better. Long-term prospects for aluminium growth are being temporarily obscured by a present over-supply of metal in relation to current consumption, and by price cutting that has seriously affected the earnings of U.S. producers.

Mr. Litchfield said that over-all U.S. aluminium industry shipments this year might not match the 1959 record of 2,480,000 tons—a comedown from some earlier predictions. Even so, the second highest shipment total in history is assured. With its basic metal-making operations now at about 86½ per cent of capacity—against an estimated industry level of just under 83 per cent—Alcoa hopes to continue at approximately the present rate for the rest of the year. Even a slight upturn in the general economy, it is stated, would give a strong boost to increased sales potentials in several big aluminium markets.

Mr. Litchfield added that Europeans, who had provided a welcome market last year for substantial quantities of U.S. metal, were expected to remain buyers as long as their very good business conditions continued and until they developed, years hence, their own capacity within their own boundaries or those of associated nations.

In this connection it is interesting to note that, according to the Commerce Department, the U.S. became one of the major exporters in 1959. Total U.S. crude aluminium sales abroad were 121,000 tons, double the 1958 total and 13 per cent of the total world aluminium exports.

According to the Department, total world exports rose last year to 960,000 tons, a gain of 15 per cent over the 1958 level. Exports of semi-fabricated aluminium at 261,000 tons gained 34 per cent. Total exports of aluminium reported by the U.S.S.R. were 85,300 tons, more than half of which went to countries of the Soviet bloc. The 1959 shipments were about one-third less than in 1958.

Canada, the major exporter of crude aluminium, shipped about 5 per cent more than in 1959, but its share of the total fell from 58 to 53 per cent as other countries increased their exports. Norway maintained its position as the second largest exporter with 15 per cent of the total. The U.S. ranked third.

\*

Péchiney and Ugine, the two French aluminium producers, have formed a company in the Cameroun to process

aluminium produced by Société Camerounaise de l'Aluminium-Péchiney-Ugine (ALUCAM). They will be associated in this venture with a number of other leading French aluminium fabricators and three prominent African commercial companies.

\*

The first commercial tests of a newly developed aluminium drill pipe have proved successful, according to a joint announcement by Reynolds Metals and the Reed Roller Bit Co., co-developers of the new product. Using Reynolds pipe and a new type of pipe joint invented by Reed for aluminium pipe, a Shell Oil Co.'s drilling rig has drilled a 10,400 ft. well near Yorktown, Texas. Aluminium pipe will cost more than steel pipe, but the producers are convinced that the additional cost will be more than to offset by its advantages.

\*

Norway should aim at a big expansion of aluminium output during the current decade, according to a recent statement by the Minister of Industry, Mr. Kjell Holler, in the Norwegian Parliament. Mr. Holler expressed the opinion that three or four new factories could and should be built during the next ten years, raising annual production from the present level of 200,000 tons to between 700,000 and 800,000 tons. This would undoubtedly involve investment in Norway by the major foreign producers. Mr. Holler indicated that, if the government decided to allow foreign firms to build plants in the country, Norway could cope with the development of hydro-electric resources which would have to precede expansion of aluminium output.

## GOLD COMES DOWN AGAIN

After soaring as high as \$41, the price of gold has lost most of its recent gains. At the London fixing on Monday morning the price was 268s. This represented an increase of 8s. over Friday's level and was equivalent to approximately \$37½. Soon afterwards it soared again to \$40, only to fall back later to the level of the "fixing". On Tuesday gold was a little cheaper on balance and at the close of the market dealers' quotations were \$37½-38½. On Wednesday quite a steep fall occurred and the metal finished the day within \$1 of the official U.S. parity of \$35. On Thursday the official price was down to 254s., equivalent to approximately \$35.68.

The sudden scramble for gold appears to have been triggered off by Wall Street's growing belief that the odds in the Presidential election were swinging slightly in Senator Kennedy's favour and that a Democratic administration would be more inclined to subordinate the stability of the currency to a policy of keeping up with the Joneskis at any cost. From a market aspect, the speed with which the price rocketed when the sudden demand arose comes as a long overdue reminder that gold is as much a commodity as any other metal and subject to the same laws of supply and demand.

If Washington is set on continued price

stabilization at the present level, it must be prepared to allow enough metal to come onto the market to achieve this aim.

A step towards halting the flow of "hot money" from the U.S. in search of higher interest has been taken by a reduction in the British Bank Rate by ½ per cent to 5½ per cent. The Germans have already attempted to tackle the problem by suspending interest payment on foreign deposits, while the Swiss have gone as far as imposing a commission of 1 per cent on additional foreign deposits in their banks.

## NEW U.S. BERYLLIUM PLANT

The Brush Beryllium Co. is to build a \$3,000,000 plant at Cleveland, Ohio, to expand by 50 per cent its capacity to finish, fabricate and machine beryllium metal. The plant, which will have 90,000 ft. of floor space, is to consolidate operations now housed in three separate shops. It is scheduled for occupation late next spring. Brush's plant at Elmore, Ohio, where beryllium metal and oxide are produced, is not affected by this project.

## U.K. ANTIMONY CONSUMPTION DROPS

U.K. consumption of antimony metal and compounds fell sharply in August to 387 Ltons (in terms of antimony metal), according to the British Bureau of Non-ferrous Metal Statistics. Use in oxides for white pigments fell to 76 tons from 148 tons in July, batteries to 141 tons from 158, oxides for uses other than white pigments to 86 tons from 95. Bearings consumed 21 tons against 23 and antimonial lead uses other than batteries 40 tons compared with 41. Total consumption of antimony in scrap fell by a modest amount, totalling 475 tons against 492 tons in July.

For the 8 months ending August 31, however, consumption totalled 3,910 Ltons against 3,053 tons in the corresponding period of last year.

## DEMAND FOR CHROMITE WIDENS

Business in the U.K. chrome ore market has recently been on a broader scale and a number of sales are reported to have matured for 1961 delivery. Regular customers in the U.K. participated in the business, while the Continent and the U.S. were also showing interest. So far as the U.S. is concerned, however, there is still much room for improvement in the rate of buying, and this situation can be expected to continue so long as the steel industry in the U.S. remains in a depressed state. There are no signs, as yet, of prices hardening, but the prevailing business should help to impart a steady undertone to the market. The ferro-alloy trade outside the U.S. is still reported to be quite good and this should ensure a fairly satisfactory offtake of ore.

U.K. imports of chrome ore during August totalled 37,594 tons against

34,489 tons in July, according to the Board of Trade statistics. For the period January-August, imports totalled 192,802 tons compared with 110,559 tons over the corresponding period of last year.

#### NEW LITHIUM REFINERY

Quebec Lithium Corporation has started tune-up of the lithium refinery at its Northwestern Quebec mine, reports *The Northern Miner*. Now that the refinery is in operation, the company is planning to resume mining and milling operations. Mining was suspended in early August last year and the mill closed temporarily at the end of November. At the suspension of milling operations, the company had a stockpile of lithium concentrate totalling 8,662 tons, from which customers for glass grade concentrate have since been supplied. The existing stockpile of chemical grade lithium is sufficient to produce 2,000,000 lb. of lithium carbonate or enough for four months' operations at rated capacity. The mill, which is capable of treating 1,000 tons of ore daily, will be operated, however, at a rate just sufficient to meet the requirements of customers and the company's own needs.

In the same issue, *The Northern Miner* reports the discovery of what, it is stated, could be one of the largest and best grade lithium deposits known to date, as indicated by visual appearance supported by the initial sampling results. The property is situated in the Assinica Lake area about 80 air miles north-west of Chibougamau. The find was made by Sirmac Mines, a company recently formed by a syndicate organized in 1959 to conduct general exploration in selected areas in Northwestern Quebec. The syndicate, and now the company, is backed by a strong group of mining companies and individuals.

#### PLATINUM IN THE U.S.

Consumption of platinum-group metals in the U.S. in the second quarter of 1960, as indicated by sales to consuming industries, was 156,200 oz., reports the Bureau of Mines, U.S. Department of the Interior. This was 43 per cent less than the first quarter and 14 per cent below that of the corresponding period of last year.

Sales of platinum in the second quarter were 40 per cent lower than in the first quarter, with sharp declines recorded in all industrial categories. Palladium sales dropped by 47 per cent due principally to sharply reduced demand by electrical industries, which accounted for over half of the total palladium sold. Sales of the minor platinum-group metals—iridium, osmium, rhodium and ruthenium—aggregated 9,200 oz., a drop of 26 per cent below the first quarter.

Refinery production of platinum-group metals (new and secondary) fell in the second quarter 23 per cent to 25,300 oz.; total working stocks held by refiners and dealers increased by 9 per cent. Palladium refining (new and secondary) was down by 17 per cent, while imports of refined platinum were 47 per cent lower than in the first quarter.

Palladium recovered by refiners decreased by 34 per cent in the quarter and imports of refined palladium by 32 per cent. Refiners' and dealers' stocks of palladium rose by 24 per cent.

## COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

No significant changes have taken place in the overall picture as far as the market is concerned during the past week. Whilst the recent downward tendency in copper and tin values has been maintained, lead and zinc prices have shown a modest improvement rather as a result of less selling pressure than any marked increase in buying interest.

#### BEARISH FACTORS PREDOMINATE IN COPPER

The London copper market, in common with other commodity markets, received some stimulus from the sharp rise in the price of gold during the latter part of last week but, in consideration of a predominance of bearish factors, the higher levels have not been maintained. At the lower price some improvement in demand has been noted which, together with some bear covering, has been sufficient to absorb rather better than otherwise might have been expected, the recent sizeable offerings of both cash and forward metal. A further rise of 249 tons to 10,115 tons in U.K. official warehouses took place last week and the contango has been fully maintained at recent rates.

In the U.S. mainly quiet conditions persist with both custom smelters and main producers reporting only routine business as buyers are inclined, under present conditions, to delay their purchases as long as possible in expectation of lower prices. Although the custom smelter price has been maintained at the same level as the producers', namely 30 c., it is regarded in some quarters as vulnerable, particularly in consideration of the further cuts which have taken place in the U.S. scrap price—now down to 22½ c., equivalent to 27½ c. for refined. U.S. consumption figures, as published for the month of September, look rather better with 112,828 s.tons of copper consumed against 107,616 s.tons in August. There was also an increase in the new business booked by fabricators to 117,759 tons against 103,750 tons, but at the same time fabricators stocks of refined metal at the end of the month increased from 457,421 tons to 465,178 tons. The Belgian price has been reduced during the week to B.frs. 30.25 per kilo from B.frs. 30.75 per kilo.

The strike situation at the Chuquibambilla mine in Chile is confused and although there has been plenty of coming and going between the various parties to the dispute, no settlement has been reported. The point has now been reached that the Union representatives have their members' authority to accept the mediators' formula of a 25 per cent general wage increase, but Anaconda's acceptance is not certain.

U.K. consumption of copper during August showed a satisfactory increase at 49,100 tons compared with 46,306 tons in July but stocks of refined and blister copper increased to 110,594 tons against 98,093 tons.

#### TIN EASES IN LONDON

The present lack of demand and the uncertain industrial outlook generally has resulted in lower tin prices in Lon-

don although the Eastern quotation has held up well and on Thursday was equivalent to £801½ per ton c.i.f. Europe.

As was to be expected with the return to normal conditions in the port of London, supplies of metal which had been held up have now been released and stocks in U.K. official warehouses increased 223 tons to 9,268 tons. This has had the effect of easing the cash price and a marked narrowing in the backwardation has taken place. Whilst a readjustment in prices of this nature is in progress, the forward quotation also comes under some pressure but it is to be expected that as the two prices draw level, some recovery will be noted in the forward price.

U.K. consumption in August showed a small increase at 1,696 tons compared with 1,638 tons in July, whilst stocks amounted to 11,771 tons against 11,797 tons. U.S. consumption increased 7 per cent in August to 6,995 t.ons against 6,520 tons in July but stocks increased during the month to 35,515 tons from 34,965 tons. The International Tin Council has announced that the amount of tin held in the buffer stock showed no change at the end of June from the figure of 10,030 tons at the end of the first quarter of the year.

#### MORE BUYING INTEREST IN LEAD-ZINC

There have been somewhat reduced offerings of both lead and zinc for nearby delivery whilst at the same time the recent low levels have attracted some buying interest. This development is perhaps more noticeable in the case of the lead market as prices have tended to be the more affected by offerings of Continental metal. In both metals, however, consumer demand is unimpressive. Modest activity in the lead market is reported from the U.S. whilst zinc sales have been at an improved rate during the past week. U.S. mine production in August at 33,000 tons was some 11 per cent down on the previous month reflecting the continuation of the two long strikes which appear no nearer settlement than they were when they began many weeks ago.

Closing prices are as follows:

	October 20 Buyers Sellers		October 27 Buyers Sellers	
<b>COPPER</b>				
Cash	£220½	£220½	£219½	£219½
Three months	£222½	£223	£221½	£221½
Settlement	£220½		£219½	
Week's turnover	15,225 tons		10,625 tons	
<b>LEAD</b>				
Current ½ month	£66½	£67	£68½	£69
Three months	£68½	£68½	£69½	£69½
Week's turnover	7,550 tons		6,275 tons	
<b>TIN</b>				
Cash	£808	£808½	£795	£796
Three months	£799½	£800	£794	£795
Settlement	£808½		£796	
Week's turnover	740 tons		795 tons	
<b>ZINC</b>				
Current ½ month	£87½	£87½	£88½	£89
Three months	£85½	£86½	£86½	£86½
Week's turnover	6,275 tons		6,075 tons	

London Metal and Ore Prices appear on inside back cover.

## Mining Finance

## Non-African, Non-Subsidy Gold Mines

In the sudden burst of activity that has hit the London bullion market and the consequent world-wide publicity that has been given to the dollar-gold relationship there has naturally been an increased inquiry by investors for the shares of gold mines that would derive a good deal of benefit from any permanently higher price for gold that may eventuate in, say, 1961 or 1962. Nearly all the answers lie in Africa, either in Ghana, Southern Rhodesia or South Africa. But some investors are still not prepared to risk their money in this continent even for a higher gold price prospect.

The only other major gold fields of the non-Soviet world lie in Australia and Canada. Both these countries operate a government subsidy for their marginal gold mines and the majority of the mines obtain assistance therefrom. If the economic circumstances of gold mining took a sharp turn for the better it is obvious that the subsidy-assisted mines would not obtain a hundred per cent benefit because part of what they gained on a higher gold price roundabout would be lost on the subsidy swings.

Three mines avoid this handicap. They are all in Australia. Two of them, Lake View and Star and North Kalgurli are U.K.

companies. The other, Great Boulder, is an Australian domiciled concern. None of the three benefits from the Commonwealth's gold-mining assistance act. They all look to have fairly long lives in front of them and the yields on the dividends currently being paid are quite reasonable. There are no racial risks and gold mining is tax free in Western Australia.

The respective share prices with the current yields are Lake View 7.8 per cent at 32s., North Kalgurli 7.4 per cent at 11s. 9d. and Great Boulder 7.8 per cent at 12s. 9d.

## S.A. COAL'S EARNINGS UP

South African Coal Estates (Witbank) raised its gross profit in the year to last June from £419,427 to £460,586, reflecting both larger coal sales and a full year of the increased price granted by the Union Government in November, 1958. Dividends, however, are unchanged at 4s. per £1 share which takes £200,000 from the net surplus of £360,831. A further £120,000 is appropriated for future capital expenditure.

An important point for these South African coal producers is whether domestic sales can be augmented by exports. In a

world glut of coal this class of business is naturally not easy to obtain, although the country's railways now have the necessary number of trucks. The chairman of South African Coal Estates, Mr. T. Coulter, says that the Transvaal Coal Owners' Association was able early in 1960 to obtain a satisfactory coal order from Ceylon.

He goes on to say that the short-term outlook for exports to eastern markets has improved following the imposition of a ban by the Indian Government on the export of coal and coke. But in the long run the value of the Oriental market to South Africa will depend on "the economic and political policies adopted by the governments of coal producing and consuming countries in that part of the world." (Chairman's statement page 480.)

## CONFIDENCE IN BERALT'S FUTURE

In his customary long and detailed speech at the Beralt Tin and Wolfram meeting the chairman, Mr. F. Gates, made the following important points. First of all he stressed that the company's position would be greatly strengthened, in view of the fluctuating fortunes of the wolfram market, if it could switch its production from wolfram to tin and back again. Work was being done to this end, but for the time being the profit-earning potential must be "related exclusively to wolfram".

Fortunately, he went on, the Panasqueira mine in Portugal is recognised throughout the mining world as one of the most important and stable sources of wolfram of an exceptional purity. A price range of 150s. to 200s. per unit would be regarded by Beralt as satisfactory for this metal. The present London quotation is 150s.

The U.S. Government holds enormous stocks of concentrates which might in certain circumstances be released to the market. Against this much research work is going on to increase the uses of tungsten (the metal derived from wolfram) and this might well lead to a substantial increase in world demand.

All in all, despite the volatility of the wolfram market, Mr. Gates regards the long-term outlook as favourable and considers that Beralt may "look to the future with confidence". The 5s. units are 31s. 6d. to yield 9.5 per cent on the 60 per cent dividend. A full profits distribution is justified, Mr. Gates adds, by the company's strong financial position built up in past years. (Chairman's statement page 481.)

## MT. ISA'S EXPANSION TEMPO SLOWS

In commenting here (Sept. 23) on Mount Isa's preliminary profit and dividend announcement for the year to June 30 last it was pointed out that the tiny yield basis on which the 5s. unit stands is accounted for by the continued earnings growth possibilities attaching to this Australian copper-lead-zinc company's expansion programme. There was therefore some market disappointment when the chairman, Mr. G. R. Fisher, said in his annual statement (included this year with the annual report) that the expansion programme schedule had been revised and "its tempo reduced".

Mr. Fisher gave as the reasons for this slow-down the presently fluctuating metal prices together with increased wages and related taxes. Wage advances, described as "heavy", will, he says, be more fully reflected in the current year's operations. They have also made it necessary to in-

(continued on page 482)

## LONDON MARKET HIGHLIGHTS

The wild rush for gold on Thursday of last week caused the dollar price in London to soar from \$35.60 to a peak of as much as \$41 an ounce and brought a scramble for Gold shares. A sharp expansion of trading in Kaffirs lifted the number of bargains marked to 737 from the previous daily level of around 250. The effect of this demand in an already oversold market was dramatic and virtually every share price in the list moved ahead under the lead of Free State Geduld which spurted 11s. 3d. to 143s. 9d.

Bargains marked on Friday climbed to 1,478 when a good deal of profit-taking in front of the week-end sharply reduced many of the previous day's gains. Free State Geduld, for instance, came back 7s. 6d. to 136s. 3d. and among non-African gold shares which had been particularly strong, the Australian Lake View and Star reacted 2s. to 31s. 9d.

A fresh demand for Golds was seen at the beginning of this week but it was noticeable that turnover on Monday contracted to 965 and prices did not usually recoup all of the previous Friday's setback. Free State Geduld closing 3s. 9d. up at 140s.

Quieter dealings in the bullion market on Tuesday were reflected by a subdued tendency in the share market and even prices of the marginal mines began to ease. This led to a sudden bout of weakness on Wednesday, the move being aggravated by a reduction of 10s. to 260s. in the fixing price for gold coupled with some profit-taking on what had become an extremely sensitive Kaffir market.

By Wednesday evening, however, Gold share prices had staged a recovery although they were still easier on the day. Free State Geduld closed with a net loss of 1s. 3d. at 136s. 3d. after having been marked down to

133s. 9d. and Western Holdings showed a similar fall on the day at 147s. 6d. after having been only 144s. 4½d. at one time.

On Thursday the gold fixing price was down to 254s. and, at the same time, the Bank Rate was cut by ½ per cent to 5½ per cent. This further indication of a readiness among European central banks to co-operate in discouraging the flow of "hot" dollars from across the Atlantic must in part have accounted for the continued easing of the Kaffir market where, in early Thursday dealings, F.S.G. fell further to 133s. 9d. and Holdings to 143s. 9d.

Just what the course of prices is going to be over the next few months is anybody's guess. On the one hand there is still the adverse factor of South Africa's political situation to be borne in mind together with the possibility that the strong demand for gold may subside as quickly as it has arisen. On the other hand, hopes of a coming rise in the U.S. price for gold will not be lessened by the approaching U.S. presidential election and the current lack of confidence in the dollar.

Other mining share markets were completely overshadowed by the activity in Golds. Copper shares, unhelpt by a drooping metal price, drifted down to new lows for the year in several cases; Rhokana fell to 40s. 7½d. and Nchanga to 42s. 6d. Messina resisted the downtrend for a while, helped by anticipations of a good final dividend next month, but the shares later subsided to 16s.

Despite some excellent company news, tin share prices tended to ease a few pence. Among them, Malayan came back 9d. to 22s. 6d. and Sungei Besi fell a similar amount to 23s. 6d.

## SOUTH AFRICAN COAL ESTATES (WITBANK) LIMITED

(Incorporated in the Union of South Africa)

### INCREASED PROFITS

The fortieth annual general meeting of members of South African Coal Estates (Witbank) Limited will be held in Johannesburg on November 22. The following is from the review by the chairman, **Mr. T. Coulter**, which has been circulated with the annual report and accounts:—

#### Accounts

The company's gross profit from coal mining increased from £419,427 to £460,586 and reflected both a greater sales tonnage and a full year of sales at the increased controlled price granted in November, 1958.

After providing for taxation the net profit at £360,831 was £51,157 higher than for the previous year. This amount, together with £98,825 brought forward from last year and a small over-provision for taxation, gave a total of £459,828 for appropriation.

Unchanged dividends of 4s per share cost £200,000 and it was decided to appropriate a further amount of £120,000 towards future capital expenditure, bringing the total under this heading to £600,000. In the balance sheet this amount has been reduced to £266,241 by the transfer to profits appropriated for capital expenditure of £333,759, representing £317,096 expended during the year on the major capital programme at Landau No. 3 mine plus ordinary capital expenditure of £16,663 after allowing for recoupments and a small decrease in trade investments.

It is expected that the balance of the major programme at Landau No. 3 mine will be completed during the current year at an estimated cost of £180,000.

#### Operations

Sales of coal for the year increased by 60,094 tons to 1,810,008 tons. This improvement was entirely accounted for by the greater quantity of blend coking coal sold from the Navigation pit to the South African Iron and Steel Industrial Corporation Limited (Iscon) which at 638,971 tons was 125,573 tons or 24.5 per cent more than in the preceding year.

Sales of bituminous coal, however, from Landau No. 3 mine, which are handled by the Transvaal Coal Owners' Association, decreased by 65,479 tons to 1,171,037 tons and reflected the lower demand for steam coal experienced by the industry in 1959 and in the early months of 1960.

Comparative sales outputs of the company's two producing pits in the past three years are as follows:

	Year ended 30.6.58 Tons	Year ended 30.6.59 Tons	Year ended 30.6.60 Tons
Landau No. 3	1,219,843	1,236,516	1,171,037
Navigation	520,152	513,398	638,971
	1,739,995	1,749,914	1,810,008

In addition 142,457 tons of steam coal middlings were despatched to Iscon, the corresponding tonnage for 1959 having been 130,937 tons.

#### Navigation Mine

The sales output of blend coking coal increased by 125,573 tons to 638,971

tons and confirmed the trend of consumption forecast in my review last year. Members will recall that the company's output of blend coking coal is drawn from the Nos. 2 and 5 Seams in its own property and that rights have been acquired to mine No. 5 Seam on a royalty basis, from Witbank Colliery Limited and from The Clydesdale (Transvaal) Collieries Limited, on small portions of the farms Witbank No. 61 and Blaauwkrans No. 62 respectively.

The table below shows the quantities and proportions in which blend coking coal was produced from the areas concerned:—

	Tons	Per cent
Navigation		
No. 2 Seam ... ..	94,455	14.8
No. 5 Seam ... ..	306,991	48.0
	401,446	62.8
Leased Areas		
No. 5 Seam ... ..	237,525	37.2
	638,971	100.0

The company's operations in the Witbank and Clydesdale lease areas were severely disrupted during the month of June following an order by the Inspector of Mines, Witbank, to cease mining the No. 5 Seam over old workings. The company immediately appealed against this decision and a Special Commission upheld the appeal. It is to the great credit of the colliery management and staff that despite the summary closing down on four sections Iscon's demands were met in full from other areas.

#### Landau No. 3 Mine

Total sales tonnage decreased by 65,479 tons to 1,171,037 tons of which 601,705 tons were sold in the second half of the year, and this may be taken as some indication of a slight improvement

in the demand for coal. It was, however, found necessary, for the second year in succession, to dump approximately 30,000 tons of saleable duff coal through lack of orders.

Satisfactory progress has been maintained in the construction of the washing plant which is expected to come into commission shortly. The plant, as described in my review last year, will be fed by a belt conveyor directly from the new incline shaft and will treat a mixture of top and bottom coal. A method of mechanical loading and transport of coal to the existing tub haulage system was operated satisfactorily in one section on a production basis and a total of 207,453 tons was handled during the year in this way. When the washing plant comes into use the degree of mechanization will be extended to deal with the greater tonnages of top coal which will be mined.

#### Export Outlook

As a result of the decision of the Railways Administration in 1958 to make available trucks for the conveyance of coal for export, the Transvaal Coal Owners' Association was able, early in 1960, to secure a satisfactory order from Ceylon.

The short-term outlook for exports to eastern markets has improved following the imposition of a ban by the Government of India on the export of coal and coke. In the long run, however, the value of the Oriental market to the South African coal industry will depend upon the economic and political policies adopted by the governments of coal-producing and consuming countries in that part of the world.

Copies of the annual report and accounts can be obtained from the London office of the company, 40 Holborn Viaduct, E.C.1.

## KWAHU MINING CO. (1925) LTD.

The annual general meeting of Kwahu Mining Co. (1925), Ltd., was held on October 25 at the Chartered Insurance Institute, London, E.C.

**Mr. A. Hedley Williams, M.I.M.M., M.Inst.Pet.**, Chairman, presided.

The following is his statement circulated with the Report and Accounts:—

As will be seen from the accounts to June 30, 1960, the Company has earned a net profit, after all charges but before taxation, of £47,514 which compares with £48,047 for the previous year. Gross revenue showed little change, the small reduction in dividends and interest being matched by a similar increase in profits on sales of shares. As a result, the Directors recommend maintenance of the dividend for the year at 30%.

The revenue derived from dividends and interest received requires some qualification since a total dividend of 12½% was received from Ghana Main Reef Limited in respect of our share-

holding in that Company for the year ended June 30, 1959, whereas the dividend from this source during the year under review was 7½%. Further, as the incidence of overseas taxation has increased generally, the amount recovered from income tax deducted from dividends received has been correspondingly reduced. It is a measure of the diversification in the Company's portfolio of investments which has been effected by the Directors in recent years that, in spite of this, our gross dividend income for the year fell by only £2,000 approximately.

The Balance Sheet shows the satisfactory position of the Company—the excess of assets over liabilities being £207,601, an increase on last year, against an Issued Capital of £110,906. This does not reflect the market appreciation on our quoted investments which, at the date of the Directors' Report, amounts to £84,372.

The report and accounts were adopted.

## BERALT TIN & WOLFRAM

The thirty-second annual general meeting of Beralit Tin and Wolfram, Ltd., was held on October 27 at Winchester House, London, E.C.

**Sir Christopher L. Bullock, K.C.B., C.B.E.**, a director of the Company presided.

The following is an extract from the speech of **Mr. F. Gates**, Chairman of the Company, which was read:—

It has been suggested from time to time in the financial press that our company is fortunate in being able to switch the emphasis of its production from wolfram to tin, and vice versa, in accordance with varying market conditions.

If that suggestion were correct, the company's position would indeed be greatly strengthened and it is with that desirable possibility in mind that the Board have during recent years devoted much attention to the exploration and development of sections of the company's property in Portugal, the mineral content of which was known to consist, mainly or entirely, of cassiterite (the technical term for tin oxide).

All the work done to date has confirmed that the Vale da Ermida and Argimela areas contain large quantities of tin; but it has yet to be established that this tin occurs in sufficient concentration for it to be economically extracted. I shall return to this point later, but I thought it advisable to make it clear that, whatever the future may reveal, the company's profit-earning potential must for the time being be related exclusively to wolfram.

### Wolfram Price Fluctuations and Prospects

As a result of an announcement towards the end of September, 1959, that sales of Government stocks were to be resumed, the price fell by no less than 20/- per unit in the space of 24 hours and it continued to fall away until it touched a low point of 122/6 in early November. It was then made known that no more Government stocks would be released in that month, and only a limited quantity in December and the price promptly recovered to 150/- by the end of November. Thereafter it remained unusually stable between 150/- and 160/- until about three weeks ago. Supply and demand are, however, still in delicate equipoise, as is evidenced by the sharp fall of 13/6 per unit in four working days which then occurred, due to substantial tonnages being again released from Government stocks.

I do not think that a runaway market such as we saw during the Korean war is of lasting benefit to our company and I should be well content in present circumstances with a market price fluctuating between 150/- and 200/- per unit.

If, however, the price were to rise above 200s, more high-cost producers would, doubtless, be tempted to resume operations and the market position is so delicately balanced that it would not take any great increase in world production to start another serious price decline.

Moreover, we should not lose sight of the fact that the U.S. Government holds enormous stocks of tungsten concentrates accumulated during and after the Korean war under high-price contracts, from which supplies might in certain

circumstances be released to the market.

On the other hand, much research work is going on, especially in the United States, with a view to increasing the applications of the peculiar properties of tungsten, particularly its very high melting point of 3,370 deg. Centigrade, in modern high-temperature industrial processes. If this work achieves any measure of success, it might well lead to a substantial increase in world demand for tungsten products.

The wolfram market will, no doubt, continue to be subject, as it always has been, to considerable fluctuations, but I regard the long-term outlook as favourable; and I consider that our company may look to the future with confidence having regard to the extent and quality of its deposit.

### Tin-Bearing Properties

At Vale da Ermida we have carried out extensive tests during recent years in the course of which nearly one million

tons of mineralized ground were extracted. However, only a small proportion of that tonnage, taken from various parts of the Vale da Ermida hill at varying levels, was of satisfactory grade. In the light of this disappointing result and the knowledge that the cost of equipping the property for large scale operations would have been formidable the Board decided to discontinue work in that area.

Work has, however, been continued on the Argimela tin-bearing property, and we have been encouraged by a favourable report on this area from an eminent mining geologist. It seems clear that the only method by which Argimela could be worked economically would be a large-scale opencast operation, which would involve heavy capital outlay, and a great deal of work still has to be done in the mine and the mill before any reliable opinion can be formed as to whether the tin values that can be extracted are high enough to warrant this outlay.

The report and accounts were adopted.

## THE CEMENTATION CO. LTD.

### MR. A. R. NEELANDS REVIEWS OPERATIONS

The Fortieth Annual General Meeting of The Cementation Company Limited will be held on November 16 at Grosvenor Hotel, Park Lane, London, W.1.

The following is an extract from the circulated statement by the Chairman, **Mr. A. R. Neelands**.

The trading profit of the Group for the year under review before charging taxation is £425,800 compared with £1,144,649 last year. The balance of profit for the year remaining for appropriation in the accounts of The Cementation Company Limited is £9,830 and gives a total of £237,087 when added to the unappropriated profits brought forward at March 31, 1959. After deduction of the Preference Dividends, £45,631, payable in respect of the year to March 31, 1960, there remains £191,456 which your Directors recommend should be carried forward to next year. In making this recommendation your Board much regrets the necessity for passing the dividend upon the Ordinary Shares.

Our tax liability is again out of proportion to the Trading Profit because of the liability to foreign taxes at high rates. Unfortunately the tax laws of certain countries where we operate profitably do not allow us to offset to the full, the Overheads or Trading Losses incurred in other areas of activity. The Net Profit of the Group after tax and deduction of Minority Interests is reduced from £440,369 last year to £74,042 this year.

These figures are most disappointing and I cannot promise that the results for 1960/61 will be any better, indeed I expect that they will be worse, but from then on there should be a continuous improvement.

Contractual losses are a hazard of our business but it is more than usually unfortunate that we should have had a series of them in a year which had few compensation to offer elsewhere. In particular we have had to bear the im-

pact of a contraction in the N.C.B. programme. A comparatively sudden contraction in the volume of business does not result in an immediate and proportionate reduction in the amount of our investment in specialized mining plant.

New contracts, however, still require further investment to service them as they are obtained. We have insufficient capital for our extended efforts and have to depend to a large extent on Bank borrowings and there is not sufficient margin at present between our interest charges and our profit returns.

### Parent Company at Home and Abroad

In the United Kingdom good progress has been made on our major civil engineering contracts for the Central Electricity Generating Board at Nant-y-Moch and Ffestiniog in North Wales. Efforts to obtain further hydro-electric work had been unsuccessful until recently when we were awarded a tunnel contract in connection with the Loch Awe Development for the North of Scotland Hydro Board. The volume of general civil work being undertaken in Britain is increasing. The Piling Department continues to expand and the record turnover obtained this year is in a large measure due to repeat orders. During the year the Soil Stabilization Department has been doing road stabilizing work abroad and contracts have been completed satisfactorily in East Africa, Rhodesia and Iran. The Ground Engineering Division has been fully employed on contracts at home and abroad.

In India our Branch has continued to expand apart from the Durgapur Contract. In Iran the Branch completed the Khorramshahr Bridge nine months ahead of schedule.

After careful investigation and consideration we have decided to form a Branch in Australia.

(Continued overleaf)

### Subsidiary Companies

The Demolition & Construction Co. Ltd. in their first full year as a member of the Group, have continued with their pattern of business. Thermacoust Limited has successfully developed and marketed new types of roofing slabs and accessories, and exports are increasing. Cementation (Muffelite) Ltd. has increased its sales of Barrymounts. The Sales Division of Quickset Water Sealers Ltd. is facing increased competition. The Contracting Division increased its turnover and profit.

The integration of the Drilling Department of The Cementation Co. Ltd. with John Thom Ltd. was completed this year. There has been a great shortage of work in Britain. Results of the operations of the Geoprosco Group have again been disappointing.

Our South African Company has had another record year both in turnover and profit. The Rhodesian Company has done well. In Canada again the main trouble is insufficient turnover.

We have changed the management of our New Zealand Company and strengthened the establishment. At the year end there was a substantial improvement.

The Irish Company has returned improved results.

## Coming Events

A series of three public lectures on vibration mills and vibration milling will be given by Dr. H. E. Rose at 5.30 p.m. on November 9, 16 and 23 at the University of London King's College, Strand, London, W.C.2.

★

Mr. L. Rotherham has accepted the invitation of the Iron and Steel Institute to deliver the 13th Hatfield Memorial Lecture. He will take as his subject "The Contribution of Metallurgy to Power Generation". The lecture will be given at the Hoare Memorial Hall, Church House, Great Smith St. London, S.W.1., at 6.30 p.m. on Tuesday, November 29, 1960.

★

The Institution of Mining and Metallurgy has announced that the annual general meeting will take place on June 15, 1961, three weeks later than originally fixed, as so many members will be attending the Seventh Commonwealth Mining and Metallurgical Congress in South Africa during April and May. There will be an ordinary general meeting on May 25.

★

The Institution of Mechanical Engineers will hold a joint meeting with the Institution of Civil Engineers and the Institution of Electrical Engineers, at the Institution of Electrical Engineers, on November 3, where Dr. William Abbott will present a paper on "Training of Overseas Graduates".

★

The Institution of Mining Engineers will hold a general meeting at the Danum Hotel, Doncaster, on November 3, when Mr. M. Brocklesby will present a paper on "The organization of management and maintenance in the coal mines in the U.S.A."

### MINING FINANCE (continued)

crease the cut-off grade of both copper and lead ores, thus by-passing large quantities of lower-grade material which would otherwise have been economic to recover.

On the brighter side is the cost-saving that will result when the new copper smelter comes into operation in 1961. It will raise smelting capacity to 70,000 tons annually instead of 44,200 tons. The balance of Mount Isa's copper concentrates assaying approximately 25 per cent metal has to be exported for smelting. This necessity will cease when the new smelter starts up with a consequent saving of substantial freight and marketing expenses.

### TWO INCOMES FOR NORTH BROKEN HILL

North Broken Hill derives part of its income from its Australian lead-zinc mine and part from its widespread mining and industrial investments in that country. At the moment these two sources are running more or less neck and neck. In the year to last June the profit of £1,250,392 comprised £623,096 from the mine and £627,296 from investments. The main improvement compared with 1958-59 came from the mine principally owing to a better price for zinc.

It is on the mining account that the prospects for North Broken Hill, as for the other lead-zinc mines of this Australian field, look a little cloudier for 1960-61. The metals being mined together, there is the persistent problem that by agreement among the western world producers the output of lead is being restricted whereas there is as yet no cutback in zinc despite the metal being in prospective surplus for 1960.

On top of this the metal prices have been tending to drift back. Lead is now about £68 a ton against a peak of over £78 a ton in the earlier part of the current year, zinc £88 against well over £90 in most of the first seven months of 1960.

It is in these circumstances that the 10s. shares of North Broken Hill have come back to an equivalent low for the year of 17s. 9d. after allowing for the bonus issue and share consolidation that took place last May. The company is an Australian one so that its profit figures, already detailed, are in the currency of that country as is the 1s. 1d. dividend, which is the payment for 1959-60 after adjustment for the capital changes. On this basis the U.K. holder is offered a yield of 4.9 per cent after allowing for the exchange loss but not for double tax relief.

### AMAL. OF NIGERIA DOING WELL

Still more tin producers have announced increased dividends this week. In particular, Amalgamated Tin Mines of Nigeria has raised its profits sharply for the year to last March. The gross figure of £384,885 is more than twice that of £182,774 for 1958-59. The net after tax comes out at £242,885, allowing dividends to be raised from 14 to 20 per cent on the 5s. shares with a final of 12 per cent. The distribution absorbs £238,875 leaving the carry-forward a little higher at £289,548.

The company will have been benefiting not only from the successive loosening of the tin restriction screw, but also from the revived market for columbite, the ore of columbium, which metal is used in rockets and jet-planes. Output is still climbing. For the first half of the current financial year the monthly returns show that 2,357 tons of tin concentrates have been produced

against 3,101 tons for the whole of 1959-60 and 323 tons of columbite against 417 tons. So there should be little doubt that profits are now running at a still higher rate. Also, for the time being, at least, there will be no tin restriction to worry about. The shares are 10s. 6d. cum dividend to yield 9.9 per cent.

### KAMUNTING PAYS MORE

Kamunting, which dredges for tin in both Malaya and Thailand, is likewise benefiting from higher production and also, of course, from the well-maintained metal price. For the year to last March the gross profit is up by £100,972 to £275,345 and the net surplus after tax is £168,345. The pay-out is £143,363 or 35 per cent on the 5s. shares against 25 per cent in the previous year. The final, now declared, is 25 per cent. It does not on this occasion represent a full distribution of earnings, £23,595 being placed to contingencies reserve. The carry-forward is slightly higher at £84,221.

Here again the production figures are interesting. Calculated from the monthly returns, output of tin concentrates in the year to last March was 1,378½ tons compared with 1,252 tons in 1958-59. In the first half of the current year the total is as much as 815½ tons. Moreover, this is prior to de-restriction of tin, which came into force on October 1. So Kamunting should also be raising its earnings further in 1960-61. The shares are 16s. 6d. cum dividend to yield 11.1 per cent.

### KWAHU'S DIVERSIFICATION

In his annual statement, Mr. A. Hedley Williams, chairman of Kwahu Mining, was able to stress the benefits of investment diversification undertaken by this company formerly associated almost entirely with Ghana and in particular with one specific gold mine there, Ghana Main Reef. He points out that in the year to June 30 the dividend received from the last-named was 5 per cent less at 7½ per cent.

Despite these adverse factors, gross dividend income received by Kwahu fell a little over £2,000 to £30,623. Mr. Williams also points out that the company has an excess of assets over liabilities of £207,601 against a modest capital of only £110,906. And this does not take into account market appreciation of investments which amounted to £84,372 on Sept. 15 last. Kwahu 2s. units are quoted at 5s. to yield 12 per cent on the 30 per cent dividend. (Chairman's statement page 480).

### HISTORIC BOOKS ON MINING

At the invitation of the Director of the Science Museum and of the President of the Institution of Mining and Metallurgy, Mr. Robert Annan, Esq., E.M., M.I.M.M., is to present a lecture on November 15, at the Science Museum on the subject of "Historic Books on Mining and Kindred Subjects."

Notice of an exhibition of the rare mining books owned by Mr. Annan appears on page 485 of this issue.

### QUARRY MANAGER

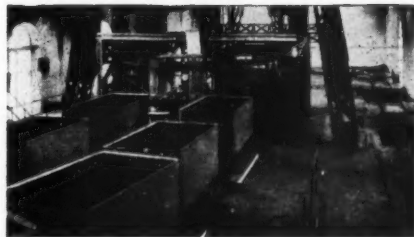
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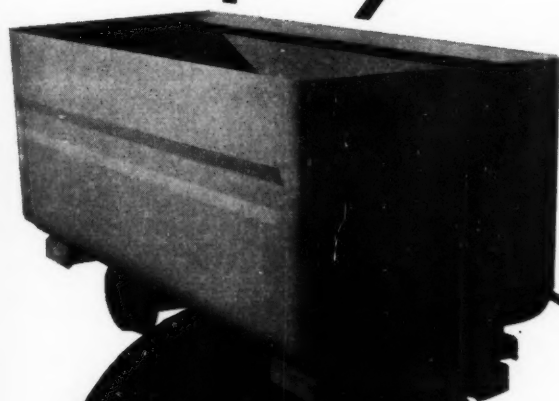


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**EXHIBITION OF MINING BOOKS**

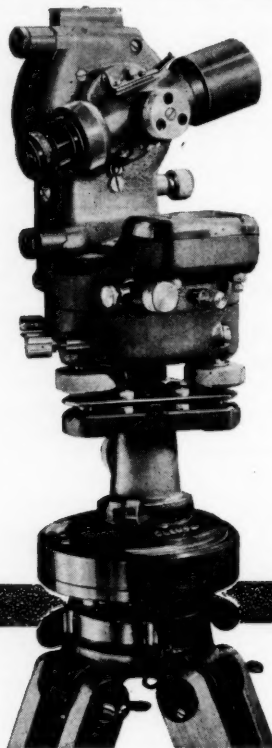
From time to time the Science Museum mounts exhibitions of historic books which have played a notable part in the development of science and industry. This exhibition is the fourth in the series.

Through the good offices of the President and members of the Institute of Mining and Metallurgy, the collection of rare and historic books owned by Mr. Robert Annan is being exhibited from November 15 to December 31, 1960. These rare books deal with mining, assaying and metallurgy, mining law and mineralogy.

Although mining has a long history, written records are extremely scanty and it was not until the early and mid-sixteenth century, when the works of Agricola and others were published, that technical records of mining and ancillary practices became generally available.

In medieval times the German miner was pre-eminent, his methods of working the ore deposits and the later treatment of the ore being much superior to those employed elsewhere. It is not surprising, therefore, that many of the rare books in the exhibition are of German origin. Books published in other countries are also to be shown: of particular interest is Gabriel Plattes' "Discovery of Subterranean Treasure" of 1639, which, although having little technical merit was the first work devoted entirely to mining to be printed in English. The oldest work on exhibition is "De Mineralibus" by Albertus Magnus (written about 1260) in the version printed at Padua about 1476 and later at Venice in 1495.

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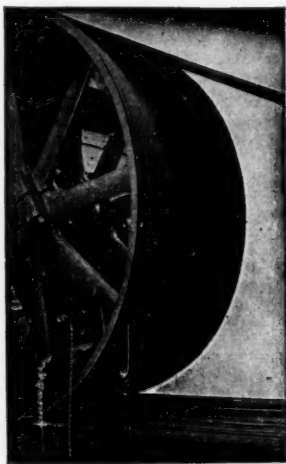
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Antimony—	Manganese Metal (96%./98%) £275/£285
English (99%) delivered, 10 cwt. and over £200	Nickel, 99.5% (home trade) £600 per ton
per ton	Osmium, £18/£22 oz. nom.
Arsenic, £400 per ton	Osmiridium, nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Palladium, Imported, £8 12s. 6d.
Cadmium 10s. 6d. lb.	Platinum U.K. and Empire Refined £30 5s.
Cerium (99%) net, £15 0s. lb. delivered U.K.	Imported £28½/£28¾
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.	Quicksilver, £70½ ex-warehouse
Cobalt, 12s. lb.	Rhodium, £43/£45 oz.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram	Ruthenium, £14/£16 oz. nom.
Gold, 254s. 0d. (at Thursday's fixing)	Selenium, 46s. 6d. per lb.
Iridium, £20/£23 oz. nom.	Silver, 79½d. f. oz. spot and 79½d. f.d.
Lanthanum (98%/99%) 15s. per gram.	Tellurium, 28s. 6d. lb.

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Antimony Ore (60%) basis .. .. .	21s. 6d./22s. 6d. per unit c.i.f.
Beryl (min. 10 per cent BeO) .. .. .	240s./245s. per l. ton unit BeO
Bismuth .. .. .	65% 8s. 6d. lb. c.i.f.
Chromite Ore—	18/20% 1s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1) .. .. .	£15 5s. 0d. per ton c.i.f.
Hard Lumpy 45% .. .. .	(Ratio 3 : 1) .. .. .
Refractory 40% .. .. .	£11 0s. 0d. per ton c.i.f.
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Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1)	Nb <sub>2</sub> O <sub>5</sub> : Ta <sub>2</sub> O <sub>5</sub> 170s./175s. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material .. .. .	£22 13s. 3d. per ton ex. works
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Lithium Ore—	
Petalite min. 3½% Li <sub>2</sub> O .. .. .	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li <sub>2</sub> O .. .. .	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li <sub>2</sub> O .. .. .	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined .. .. .	£28 0s./£30 0s. d/d
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Fused oxide 95% V <sub>2</sub> O <sub>5</sub> .. .. .	8s./8s. 11d. per lb. V <sub>2</sub> O <sub>5</sub> c.i.f.
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